(1.46–1.59)
(2.00–4.25)

pm **Photo SISFA 2012 Session**

Parallel–contributes sessions

***Sala degli Affreschi* room**

Invited Talk and Chair: Liliane ALFONSI[9] (France)

A turning point in French officers training: Mechanics in the mathematics course of Étienne Bézout (1730–1783).

Contributes session:

1. Marcella Giulia Lorenzi (I), Mauro Francaviglia (I) and Luciana De Rose (I). *Stars, numbers and symbols in the Fresco of Marino Mithraeum.*
2. Arcangelo Rossi (I). *Developments of English science and scientific popularization between '700 and '800.*
3. Danilo Capecchi (I) and Giuseppe Ruta (I). *The polytechnic schools in germany in the 19th century.*
4. Raffaele Pisano (I). *On the emergency of physical and mathematical objects in the 19th century.*
5. Stefano Bordoni (I). *From scientia to scientia: Salvo D'Agostino's history of physics and the tradition of theoretical physics.*

Plenary Room 1

Invited Talk: Daniel ŠPELDA (Czech Republic)

Early modern histories of astronomy: On searching for antediluvian astronomy and vision of astronomical progress.

Chair: Massimo Mazzoni (Italy)
Contributes session:

1. Flavia Marcacci (I). *World systems compared: manuals of astronomical instruments between Nicholas Bion and minor artisans in XVII century.*
2. Fernando B. Figueiredo (Pt). *Explorating the beginning of the astronomical scientific activity of the astronomical observatory of the university of Coimbra (1772–1813).*
3. Enzo Bonacci (I). *The "Livio Gratton" planetarium in Latina (Italy).*
4. Matteo Realdi (E). *The tortuous path to high mountain astrophysics. The construction of a Jesuit observatory in the Sierra Nevada (1965–1969).*
5. Federica Maffioli (I) and Gianfranco Medici (I). *Paolo de Saint Robert* and *Receding of the glaciers*

(4.30–4.40)
(4.45–6.05)

Coffee Break

***Sala degli Affreschi* room**

Continuous from previous contributes session
Chair: Liliane Alfonsi (France)

6. Helen Fragaki (Fr). *Court engineering in Ptolemaic Alexandria.*
7. Marco Taddia (I). *Beaten by a Nose. How did Félix Bernard Contribute to the Beer's Law of Colorimetry?*
8. Arturo Gallozzi (I). *... may God protect you from lightning ...*
9. Angelo Pagano (I). *The laws of statics in the work of Archimedes as formalized by Salvatore Notarrigo.*

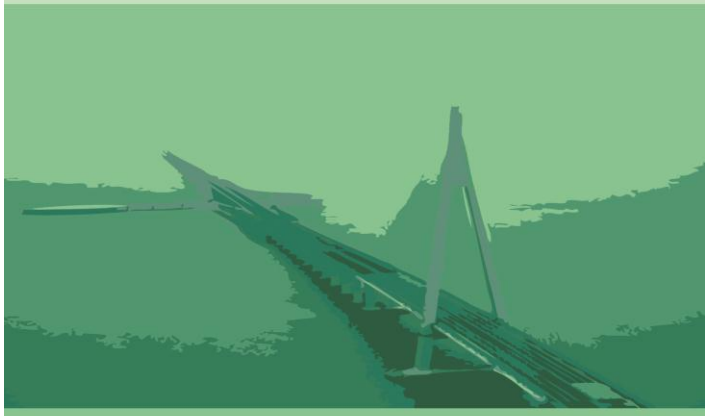
Plenary Room 1

Continuous from previous contributes session
Chair: Massimo Mazzoni (Italy)

6. Gianfranco Medici (I) and Federica Maffioli (I). *Paolo de Saint Robert and the True meaning of a tercet of Dante*
7. Fabrizio Bònoli (I), Elena Cenacchi (I), Agnese Mandrino (I), Raffaella Stasi (I), Diego Zuccato (I). *Digitization and online publishing of the whole historical archive of the department of astronomy of the university of Bologna.*
8. Paolo Bussotti (I). *The Concept of Force in Johannes Kepler.*
9. Maria Luisa Tuscano (I). *The scientific work of Antonio Maria Jaci in Messina.*

[9] Introduced by Anna Lukešová (Cz).

XXXII CONGRESS OF THE ITALIAN SOCIETY OF HISTORIANS OF PHYSICS AND ASTRONOMY



PHYSICS, ASTRONOMY AND ENGINEERING
A bridge between science and engineering

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SISFA

RCTHS
RESEARCH CENTRE FOR THE THEORY AND HISTORY OF SCIENCE

FACOLTÀ DI INGEGNERIA CIVILE E INDUSTRIALE
SAPIENZA UNIVERSITÀ DI ROMA

SISFA 2012

Schedule&Programme

27–28–29 September 2012
Faculty of Engineering
University of Roma La Sapienza
Via Eudossiana, 18
Roma, Italy

SAPIENZA UNIVERSITÀ DI ROMA

Edited by Raffaele Pisano and Anna Lukešová

Table of Contents

Welcome Address and Acknowledgments

Dear SISFA Members,
Dear New SISFA Members,
Dear Friends and Colleagues

The genesis of such an international and large organizing has deep roots, and the final result has been a long time in the making. In effect, we had not so much time, but we managed to prepare this event. Thus, we hope that the result would satisfy your expectations. When the ideas and production of a work of this nature is carried out over a significant period of time, many friends and scholars become contributors to both the working in process.

On behalf of the Organizing and Program Committees we welcome You to the XXXII International Congress of the *Italian Society of Historians of Physics and Astronomy* (SISFA) held in the Capital of Italy, Roma. This year of the Congress is held in collaboration with the *Research Centre for the Theory and History of Scienc*e (RCTHS) University of West Bohemia in Pilsen, Czech Republic, the *Faculty of Engineering*, and the *Departament of Ingegneria Strutturale e Geotecnica*, University of Roma La Sapienza.

We are very honoured that the *European Society for the History of Science* (ESHS) and the *National Academy of the Sciences called of XL* (Italy) has generously agreed their patronage.

SISFA 2012 represents the historical current state of the art of offering new perspectives in history of physics, history of astronomy and related to epistemological and philosophical disciplines. In total we have:

74	Registered participants
12	Countries
7	International plenary speakers
8	International invited talks
13	Sessions: plenary, invited talks, physics lecture on Higgs Boson, contributes, concert, *General lecture Farady*, exhibition of ancient book, exhibition of ancient instruments, SISFA assembly session, D'Agostino tribute, panels, congress dinner, SISFA photo
69	International individual talks

All abstracts submitted have been accepted after peer–reviewed job both in editing and contents. Thus a high and recognized level of contents should be offered, confirming that after 32 years SISFA still offers not only a place for scientific–historical communication, but also a forum for individual and collective research projects to reach, since also in 2012 a wide international audience is expected.

For the second time, after XXVI SISFA 2006, the Congress is held in Rome. Although some of us were also main organizers of 2006, the SISFA organizing committee has now provided a new interdisciplinary special topic:

> *Physics, Astronomy and Engineering. A Bridge between Science and Engineering*. It illuminates issues of major significance: the interaction between historical–epistemological methods of investigations and science and technologies including their integration in foundations of science (pure and applied) and society in the 19th. The general theme of the XXXII SISFA Congress is to analyse historical problems related to the use of physics, mathematics and geometry in applied sciences, to be covered by a series of invited speakers. A main question would be: *when and why the tension between mathematics, physics, astronomy, gave rise to a new scientific discipline, the modern engineering?* Individual contributions are general but correlated with scientific topics and within the following areas: *Anthropology, Archives, Epistemology of science, Foundations of science, Historical epistemology of science, History and epistemology of chemistry, History and epistemology of cosmology, History and epistemology of physics, History and epistemology of science, History epistemology of mathematics, History of architecture, History of astronomy, History of biology, History of chemistry, History of cosmology, History of engineering, History of foundations of science, History of medicine, History of physics, History of science, History of science and science education, History of physics and science education, History of mathematics and science education, History of science and logics, History of science and technique, History of science and technology, History of science, society and industry, History of scientific ideas, History of scientific institutions, History of scientific instruments, History of technology, History of scientific drawing, Museum, Philosophy of mathematics, Philosophy of physics, Philosophy of science, Philosophy of science and science education, Theory of science*.

We are indebted to many persons and institutions for their integrated efforts to realize this meeting. Firstly and foremost we would like to thank the members of our *Organizing Committee*. It has been a great pleasure to work with our colleagues and staff in these committees. The presidential role was given to Danilo Capecchi. The competence and professionalism of especially Raffaele Pisano and Anna Lukešová should be appreciated, since they worked very hard during the past moths: setting up an outstanding and attractive program and staging it in a comfortable surrounding that would make the congress a scientifically and socially enjoyable event. The effort of Raffaele Pisano who supervised the whole management work deserves to be particularly acknowledged.

We warmly thank Fabrizio Vestroni, Dean of the *Faculty of engineering* (University of Roma La Sapienza) for his kindly hospitality and financial support. Mary Joan Crowley Director of the of the *department Library*, and Laura Barattucci, Director of *"Giovanni Boaga" Library* of the *Faculty of Engineering* for their interesting ancient books exhibition. Fulvio Medici, printing&graphics Centre (*Faculty of Engineering*) for his technical support. Pietro Maioli, I.T. staff coordinator (*Faculty of Engineering*). Thus we also thank the *Department of Ingegneria Strutturale e Geotecnica* (*Faculty of Engineering*), particularly its Head, Augusto Desideri for his support concerning proceedings, and Ph.D. Giuseppe Rega, Director of Ph.D. school in *Civil Engineering and Architecture*, who allowed his PhD students to kindly help us this during 3–days Congress: Stefania Caravelli, Oriana De Gaudenzi, Giannicola Giovino, Giuseppe Habib, Agnese Murali, Carlo Priori, Valeria Settimi, Giovanna Valeri.

We thank Past President of SISFA, Enrico Giannetto for having paid his attentions during our organization and encouragement.

Marco Ceccarelli (*University of Cassino*, Italy), Jean Dhombres (*Centre Alexandre Koyré/CNRS/EHESS*, France), Peter Heering (*University of Flensburg*, Germany), Radim Kočandrle (*RCTHS, University of West Bohemia in Pilsen*, Czech Republic), and Walter Noll (*Carnegie Mellon University*, United States of America) for their kind acceptance and

distinguished lectures. Last but not least, Frank A.J.L. James (*The Royal Institution of Great Britain*, United Kingdom) for offering the special evening "General Faraday Lecture". Particularly we are proud to have offered in Italy our hospitality to *mathematical world* of Walter Noll and present science and correlated technologies in an exciting manner (like Michael Faraday used to do) talking to large audience and exploring the fascinating world of pure and applied sciences. Aleandro Nisati (*I.N.F.N. Sezione di Roma–CERN*, Italy/Switzerland), *ATLAS Physics coordinator* for having shared with us his latest results (4 July, 2012) from *ATLAS–CERN* on search of the Higgs boson particle at *Large Hadron Collider* (LHC).

Thanks also goes to Maestro Claudio Buccarella (*I Musici*) and Giulia Capecchi (*Conservatorio Santa Cecilia*) for the splendid concert for two violins kindly dedicated to all SISFA 2012 participants. And for the following Journals and their Editors in–chief such as partnership involved in SISFA 2012 Congress: *Springer Verlag–Italy* (Francesca Ferrari, Italy) *Springer NL HMM book series*, (Nathalie Jacobs & Anneke Pot, The Netherlands), *Centaurus* (Ida Stamhuis, The Netherlands), *History Research* (Felix Smith, David Publishing, U.S.A), *Philosophy studies* (Karen Garcia, David Publishing, U.S.A), *Scientia Educologica Methodical Centre & publisher* (Vincentas Lamanauskas, Šiauliai University, Lithuania). Thus we would like to thank all our momentary and regular SISFA participants in Roma 2012.

Finally we owe gratitude to many such people and will never manage to thank them all appropriately. Without the generous support and collaboration of the *Faculty of Engineering*, (University of Roma La Sapienza), *Research Centre for the Theory and History of Science* (University of West Bohemia in Pilsen, Czech Republic), and the *Department of Ingegneria Strutturale e Geotecnica*, this meeting, and related to official international proceedings would not have been possible.

To all these and other involved institutional partners we express our warm gratitude: *Società Astronomica Italiana già degli spettroscopisti*, *Centro di Ricerca Interuniversitario di Filosofia e Fondamenti della Fisica*, *Dipartimento di Scienze di Base e Fondamenti*, *Associazione Italiana di Storia dell'Ingegneria*, *Museo del Mezzi di Comunicazione*.

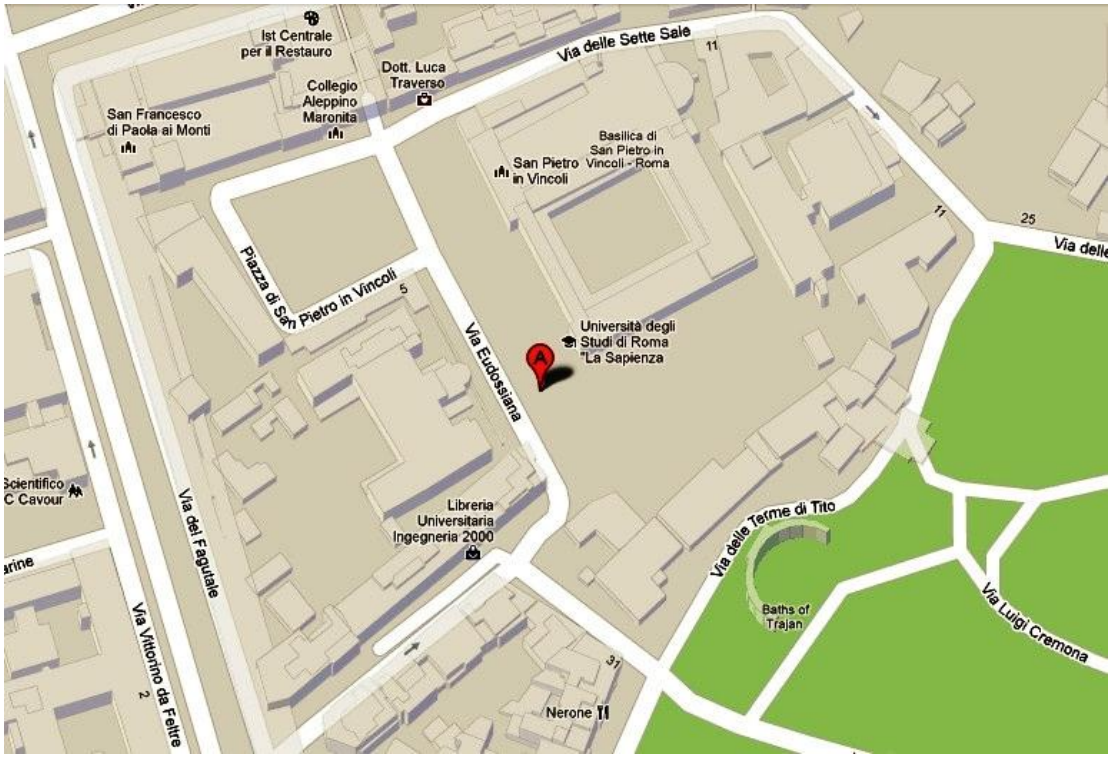
We wish you fruitful discussions and exchanges during the congress, and a pleasant stay in the historical city of Roma.

Roma, 2012

Organizing Committee

Venue & Lobby desk

Venue
Faculty of Engineering
University of Roma La Sapienza
Via Eudossiana, 18
Roma, Italy



Google Map © – SISFA 2012 Congress Venue Map View

Lobby & Helpdesk
Chiostro, Faculty of Engineering, University of Roma La
Venue: Faculty of Engineering
University of Roma La Sapienza
Via Eudossiana, 18
Roma, Italy

Anna Lukešová	RCTHS–SISFA 2012 Secretary	alukesov@kfi.zcu.cz
Danilo Capecchi	+39 366–6802864	danilo.capecchi@uniroma1.it
Raffaele Pisano	+ 39 339–3164592	pisanoraffaele@iol.it

Congress' Sites & Early Facilities

Events at *Chiostro*, Faculty of Engineering, University of Roma , La Sapienza

Welcome Lobby & Help Desk
Daily 3–days Congress, *Faculty of Engineering*

Thursday, 27 September 2012
Plenary *Sala del Chiostro* (200 s.) Room, *Faculty of Engineering*
Sala degli Affreschi (60 s.) Room, *Faculty of Engineering*
8.30 am – 11.00 pm

Thursday, 27 September 2012
Concert for Two Violins & *"General Faraday" lecture*
Chiostro Area, Faculty of Engineering
From 8.30 pm

Friday, 28 September 2012
Plenary Room 1 (200 s.), *Faculty of Engineering*
Sala degli Affreschi (60 s.) Room, *Faculty of Engineering*
8.30 am – 8.15 pm

Friday, 28 September 2012
Plenary Room 1 (200 s.): General SISFA Assembly, *Faculty of Engineering*
6.40 pm – 7.45 pm

Thursday and Friday, 27–28 September 2012
Ancient and Rare Books Exhibition
Chiostro Area, Faculty of Engineering

Thursday and Friday, 27 September 2012
Ancient and Rare Measurements Instruments Exhibition
Faculty of Engineering

Events at *Sala degli Affreschi*. A particular of the "Pozzo" at *Chiostro* (fl. early 500, attributed to Giuliano da Sangallo's tradition) with coat of the Della Rovere and Sisto IV and Giulio II' names, Faculty of Engineering University of Roma , La Sapienza

Saturday, 29 September 2012
Sala degli Affreschi (60 s.) Room, *Faculty of Engineering*
8.00 am – 1.30 pm

Congress dinner, **Friday, 28 September 2012 h. 9.00 pm**
Taverna Urbana Restaurant http://www.ristorantetavernaurbana.com
Via Urbana 137, Roma, Tel.: +39 06–48 84 439
Preliminary Reservation is mandatory to: sisfa2012@gmail.com
The dinners costs 40 Euros directly at help desk SISFA 2012 Congress

Free Catering (coffee break and lunch) for SISFA 2012 Registered–Participants only
Chiostro Area around the main site of the Congress Venue

Copying Machine
If you need to make photocopies, please ask the Lobby Desk. These can be made within 24 hours. Please anticipate your request.

Phone
The dialing code to call Italy from abroad or from a foreign mobile phone is + 39.

Change
Information at the Lobby Desk

Electric Outlet
In Italy, electric power is 220 W. Power adapters may be necessary depending on your electric devices.

Weather
The late–September weather in Roma is usually warm. Daily temperature ranges from 20°C to 30°C (68F to 86F). Nevertheless, it depends on and so weather also may be warm and rainy, so it is wiser to have an umbrella.

Free Wifi SISFA 2012 Net

The codes required to connect are

Username: included in the congress' bag at venue
Password: included in the congress' bag at venue

Disclaimer and Remarks

Links and references to third party sites

The SISFA 2012 Organizing Committee and related www.RCTHS.eu website and its contents, included SISFA 2012 Congress. Our web site may contain links and telephone numbers to other institutions and web Sites. The latter are not under our control of and we are not responsible for the contents of any linked sites, including without limitations of any link contained, or any changes or updates to. We are not responsible for webcasting or any other form of transmission received from any third part link. We are providing these links to you only as a convenience, and the inclusion of any link does not imply endorsement by ours of the website or any association with its operators.

Remarks

This Schedule&Programme – like all information presented in the web pages – shows the preliminary outline of registrations scheduled. A final and updated Schedule&Programme will be posted on web and in .pdf format for your downloading once it has been arranged. Thus, this document will be updated to reflect any changes best before 21st of August 2012.

Please note that information here is confirmed to the best of the organizers' knowledge and current registrations & payments. We will revise the details for reasons beyond our control since only *registered & paying* are entitled to receive SISFA 2012 congress venue materials and facilities.

Submission and registration deadline is 21st August 2012. After this date, no registration and no submission are allowed.

Committees

Chairpersons of the SISFA 2012 Congress

Danilo Capecchi (Italy)
Raffaele Pisano (France/Czech Republic)

Scientific Committee[1]

Arcangelo Rossi (*University of Lecce*, Italy)
Danilo Capecchi (*University of Roma La Sapienza*, Italy)
Enrico Giannetto (*University of Bergamo*, Italy)
Leonardo Gariboldi (*University of Milano*, Italy
Lucio Fregonese (*University of Pavia*, Italy)
Paolo Brenni (*Fondazione Scienza e Tecnica*, Italy)
Raffaele Pisano (*University of Nantes*, France/*University of West Bohemia*, Czech Republic)
Roberto Mantovani (*University of Urbino*, Italy
Salvo D'Agostino (*University of Roma La Sapienza*, Italy)

International Organizing Committee

Danilo Capecchi (*University of Roma La Sapienza*, Italy)
Raffaele Pisano (*University of Nantes*, France/*University of West Bohemia*, Czech Republic)
Anna Lukešová (*University of West Bohemia*, Czech Republic)
Antonio Di Meo (*University of Roma La Sapienza*, Italy)
Flavia Marcacci (*University of Urbino*/*Pontifical Lateran University*, Italy)
Giovanni Battimelli (*University of Roma La Sapienza*, Italy)
Giuseppe Ruta (*University of Roma La Sapienza*, Italy)
Ludmila Dostálová (*University of West Bohemia*, Czech Republic)
Marco Ceccarelli (*University of Cassino*, Italy)
Massimo Mazzoni (*University of Firenze*, Italy)
Salvatore Esposito (*I.N.F.N. sezione di Napoli*, Italy)

Contacts

Danilo Capecchi danilo.capecchi@uniroma1.it
Raffaele Pisano pisanoraffaele@iol.it

Official Congress email

sisfa2012@gmail.com

[1] Alphabetical name order.

International Key–Note Scholars

Plenary Speakers[2]

Frank A.J.L. JAMES (1955, U.K.)
The Royal Institution of Great Britain
United Kingdom

Frank A.J.L. James is *professor of the History of Science at The Royal Institution of Great Britain. He has written widely on science and technology in the nineteenth century and how they relate to other areas of society and culture, for example technology, art, religion and the military. He is particularly interested in the processes by which knowledge created in a laboratory is applied in practical situations, an area where the Royal Institution played an enormously significant role. He is editor of the Correspondence Michael Faraday (now complete in six volumes). He is Past President of the Newcomen Society for the History of Engineering and Technology and is Past President of the British Society for the History of Science. He is the chair of the National Organising Committee for the 24th International Congress for the History of Science and Technology to be held in Manchester in July 2013).*

Jean DHOMBRES (1942, France)
Centre Alexandre Koyré–CNRS, *Ecole des Hautes Etudes en Sciences Sociale,* Paris
France

Jean Dhombres is *Directeur d'études at Ecole des Hautes Etudes en Sciences Sociale, Paris, Directeur de recherche et professuer émérite at Centre National de la Recherche Scientifique (CNRS). Professor at University of Nantes, later was appointed as Directeur d'études at Ecole des Hautes Etudes en Sciences Sociale, Paris. His research concerns both mathematical aspects on functional analysis and equations, and features regarding history of mathematics: institutions (Ecole polytechnique, Ecole Normale, Académie des Sciences, Expédition d'Egypte), cultural aspects (from Révolution to Restauration, baroque science, etc..), concepts (relative numbers, theory of proportions, concept of function, equations etc..), biographies (Fourier, Lazare Carnot, de Saint–Vincent, Gergonne), books (leçons de l'École normale de l'an III). He is author of distinguished works concerning Leçons sur le calcul différentiel et le calcul intégral by Jean Bernoulli, l'Analyse des Infiniment petits by de l'Hôpital, Integer calculus by Jean Bernoulli (Opera omnia).*

[2] Alphabetical name order.

Marco CECCARELLI (1958, Italy)
Dipartimento di Ingegneria Civile e Meccanica, University of Cassino and South Latium, Italy

Marco Ceccarelli obtained four Honoris Causa Doctor Degrees in Engineering from National University of Lima, Perù, Technical University of Kursk, Russia, Technical University of Brasov, Romania and from University of Craiova, Romania, for his academic and scientific career, and his support to the academic activity. He is an ASME fellow and IFToMM past President. He is professor of mechanics of machines and mechanisms, and director of the Laboratory of Robotics and Mechatronics (LARM) at Cassino University. In the field of history of science he has carried out a pioneering activity in addressing attention to the History of Mechanical Engineering from technical viewpoints. This activity has attracted great interest within the worldwide IFToMM community (International Federation for the Promotion of Mechanism and Machine Science) and collaboration with historians from the traditional community of history of science, by organizing symposia and workshops and by chairing the Springer book series on History of Machine and Mechanism Science. Particularly, he carries out researches on historical developments of mechanism and machine Science, such as machines, mechanisms, kinematics, and design methods, beside working on Robotics and Mechanism Design.

Peter HEERING (1961, Germany)
Institute of Physics and Chemistry and its Didactics, University of Flensburg
Germany

Peter Heering is professor of physics and physics didactics at the University Flensburg since 2009. He was trained at the University Oldenburg where he completed his Ph.D. in 1995. In 2006 he completed his habilitation in history of science. Between 1996 and 2009 he was senior lecturer at the physics institute of the University Oldenburg. In 2004, he was Scholar–in–Residence at the Deutsches Museum Munich, in 2006/7 he was professorial substitute of the chair for physics didactics at the University Augsburg. His main research interests are historical scientific practices, which he analyses with the replication method, the relation between research and teaching experiments and the implementation of history of science in science education. He is currently President–elect of the IHPST–Group (http://ihpst.net/) and Vice–President of the Inter–divisional Teaching Commission of the International Union of History and Philosophy of Science.

Radim KOČANDRLE (1975, Czech Republic)
Research Centre for the Theory and History of Science, University of West Bohemia in Pilsen
Czech Republic

Radim Kočandrle is assistant professor at the department of Philosophy, Faculty of Philosophy and Arts, University of West Bohemia in Pilsen, Czech Republic. He works on ancient history–philosophy of cosmology mainly focused on the Presocratics period. On the latter, a Ph.D. thesis at Department of Philosophy and History of Natural Science, Faculty of Science at Charles University in Prague, Czech Republic was brilliantly provided. Kočandrle is one of the main member of the Research Centre for the Theory and History of Science. His historical and philosophical main interests are largely published concerning history and cosmology of science on Anaximander of Miletus, Physis of the Ionian thinkers, early map of the Ancient world, etc.

Walter NOLL (1925, Germany)
Department of Mathematical Sciences, Carnegie Mellon University
United States of America

Emeritus professor of mathematics at Carnegie Mellon University, Noll has served as several scientific communities and numerous article, books on mathematics, thermodynamics and history of foundations of science. He also was visiting professor at eminent universities such as Johns Hopkins University, University of Karlsruhe, Israel Institute of Technology, Ecole Polytechnique in Nancy, University of Pisa, the University of Pavia, and Oxford University. For his exceptional and distinguished career he received many honorary achievements such as "The Mathematical World of Walter Noll" (*Springer–Verlag*, 1996). *He is best known for developing mathematical tools of classical mechanics and thermodynamics. His work concerns mostly with the conceptual foundations of some branches of pure mathematics and also of the mathematics that underlies some physical theories, in particular classical continuum mechanics and thermodynamics as well as special relativity. Since 60's he is the main specialist of "Non–Linear Field Theories of Mechanics". He was the first Ph.D. student of* Clifford Ambrose Truesdell (1919–2000) *and later was also co–author with him in many mathematical foundations researches which became the standard reference work in the field. His works are translated and reprinted in several languages, into Chinese, too.*

Invited Guest Physics Lecture on Higgs Boson

Aleandro NISATI (1959, Italy)
I.N.F.N. Sezione di Roma–CERN, Italy–Switzerland
Italy–Switzerland

Alenadro Nisati is I.N.F.N. (The Italian Institute of Nuclear Physics) physicist researcher and scientific associate at CERN on LHC (Large Hadron Collider), Geneva: origin of the electroweak symmetry breaking, as well as the search of new physics beyond the Standard Model. His research regards with new and strange particles producing a large publishing–and–spreading–job within the ECFA (The European Committee for Future Accelerators) particularly on Higgs searches, as well as studies of muon production, in proton–proton collisions at the LHC. He is one of the main founding physicists of one of the two main experiments at LHC, A Toroidal LHC ApparatuS (ATLAS) where he is Physics Experimental Coordinator: scientific program and the project on muon detection and spectrometer, trigger system. Nisati also designed the first–level muon trigger algorithm, as well as the one of the second–level and for that he was elected chair of the Trigger/DAQ Institutes Board until 2007, and Higgs group co–convener for next two years. Recently (2012) he is also coordinator of the "ATLAS Input to the European Strategy Preparatory Group" and candidate as Spokeperson of the experiment. ATLAS (and CMS, the main experiments at LHC) has found in summer 2012 a strong evidence of the production at the LHC of a new boson with mass near 126 GeV. This new particle is consistent, within the current available experimental accuracy, with the Standard Model Higgs boson.

Invited Talks[3]

Agamenon Rodrigues Oliveira (*Polytechnic School of Rio de Janeiro*, Federal University of Rio de Janeiro, Brazil)
Daniel Špelda (*Research Centre for the Theory and History of Science*, University of West Bohemia in Pilsen, Czech Republic)
Liliane Alfonsi (*Laboratoire Groupe d'Histoire et de Diffusion des Sciences d'Orsay*, Université Paris–Sud, Orsay, France)
Mauro Francaviglia (*Italian Society of General Relativity*, University of Torino, Italy)
Michela Cigola (*Dipartimento di Ingegneria Civile e Meccanica*, University of Cassino, Italy)
Salvatore Esposito (*I.N.F.N. – Sezione di Napoli*, Italy)
Steffen Ducheyne (*Centre for Logic and Philosophy of Science*, Free University of Brussels, Belgium)
Young S. Kim (*Center for Fundamental Physics*, University of Maryland, U.S.A.)

Chairs of the Sessions[4]

Anna Lukešová (*Research Centre for the Theory and History of Science*, University of West Bohemia in Pilsen, Czech Republic)
Antonio di Meo (*Faculty of Philosophy*, University of Roma La Sapienza, Italy)
Arcangelo Rossi (*Dipartimento di Fisca*, University of Lecce, Italy)
Danilo Capecchi (*Dipartimento di Ingegneria Strutturale e Geotecnica*, University of Roma La Sapienza, Italy)
Flavia Marcacci (*Dipartimento di Scienze di Base e Fondamenti*, University of Urbino/*Faculty of Philosophy*, Pontifical Lateran University, Italy)
Giuseppe Ruta (*Dipartimento di Ingegneria Strutturale e Geotecnica*, University of Roma La Sapienza, Italy)
Liliane Alfonsi (*Laboratoire Groupe d'Histoire et de Diffusion des Sciences d'Orsay*, Université Paris–Sud, Orsay, France)
Ludmila Dostálová (*Research Centre for the Theory and History of Science*, University of West Bohemia in Pilsen, Czech Republic)
Marco Ceccarelli (*Dipartimento di Ingegneria Civile e Meccanica*, University of Cassino, Italy)
Massimo Mazzoni (*Osservatorio Astronomico di Arcetri*, University of Firenze, Italy)
Raffaele Pisano (*Centre François Viète*, University of Nantes, France/*Research Centre for the Theory and History of Science*, University of West Bohemia in Pilsen, Czech Republic)
Roberto Mantovani (*Physics Laboratory Urbino Museum of Science and Technology*, University of Urbino, Italy)
Salvatore Esposito (*I.N.F.N. – Sezione di Napoli*, Italy)
Salvo D'Agostino (*Dipartimento di fisica*, University of Roma La Sapienza, Italy)
Steffen Ducheyne (*Centre for Logic and Philosophy of Science*, Free University of Brussels, Belgium)
Young S. Kim (*Center for Fundamental Physics*, University of Maryland, U.S.A.)

[3] Alphabetical name order.
[4] *Ibidem*.

Patronages and Involved Institutions

Patronages

Sotto l'Alto Patronato del Presidente della Repubblica

European Society for the History of Science ESHS

Accademia Nazionale delle Scienze detta dei XL 1782

Involved Institutions/Collaborations

Facoltà di Ingegneria Civile e Industriale
Sapienza Università di Roma

Dipartimento di Ingegneria Strutturale e Geotecnica
Sapienza Università di Roma

Società Astronomica Italiana 1871 Società degli Spettroscopisti

Museo dei Mezzi di Comunicazione

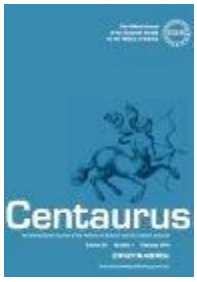
1506 Università degli Studi di Urbino Carlo Bo
Dipartimento di Scienze di Base e Fondamenti

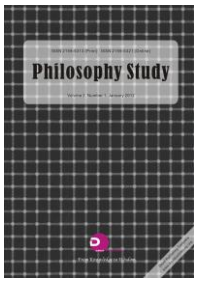
Associazione Culturale Torre del Conte Paolo Ballada di Saint Robert

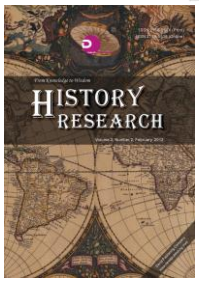
AISI

Comune di Castagnole delle Lanze

federica maffioli architetto andrea ruggeri







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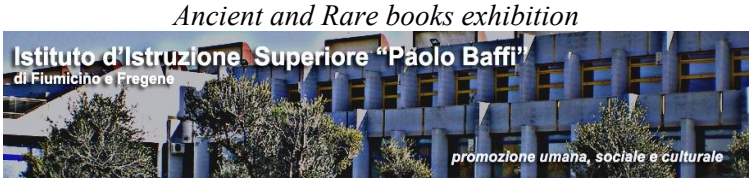

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CFP: Philosophy Study, USA

Print ISSN: 2159-5313 Online ISSN: 2159-5321 Frequency: monthly Current Volume: 2/2012

Dear SISFA 2012 Participants,

This is a new journal titled *Philosophy Study* started in June 2011. Thanks to Dr. Raffaele Pisano, who is the conference organizer and is on the journal's editorial board, we have a chance to introduce it to you. Hope we could get your support.

Philosophy Study is a professional academic journal covering all sorts of research on Epistemology, Ethics, History of Philosophy, Philosophy of Science, Philosophy of Language, Philosophy of Religion, Philosophy of Mind, Political Philosophy and other relevant areas, and tries to provide a platform for scholars worldwide to exchange their latest findings. As the journal is peer-reviewed, all papers considered appropriate for the journal are reviewed anonymously by one or two (sometimes three) reviewers. Authors should make the suggested corrections and are required to sign a Copyright Transfer Agreement Form if the referee(s) recommend accepting their paper(s).

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CFP: History Research, USA

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History Research is a monthly professional academic journal covering all major areas of history research on political history, economic history, Military history, Science & Technology history, art history, and other relevant areas. It publishes articles that make outstanding contributions to scholarly knowledge about notable theoretical concerns, puzzles or controversies in any subfield of history research.

History Research is a peer-reviewed journal. All papers considered appropriate for the journal are reviewed anonymously by one or two (sometimes three) reviewers. Authors should make the suggested corrections and are required to sign a Copyright Transfer Agreement Form if the referee(s) recommend accepting their paper.

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Felix Smith

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Practical Information

Reaching Congress Venue

By bus:

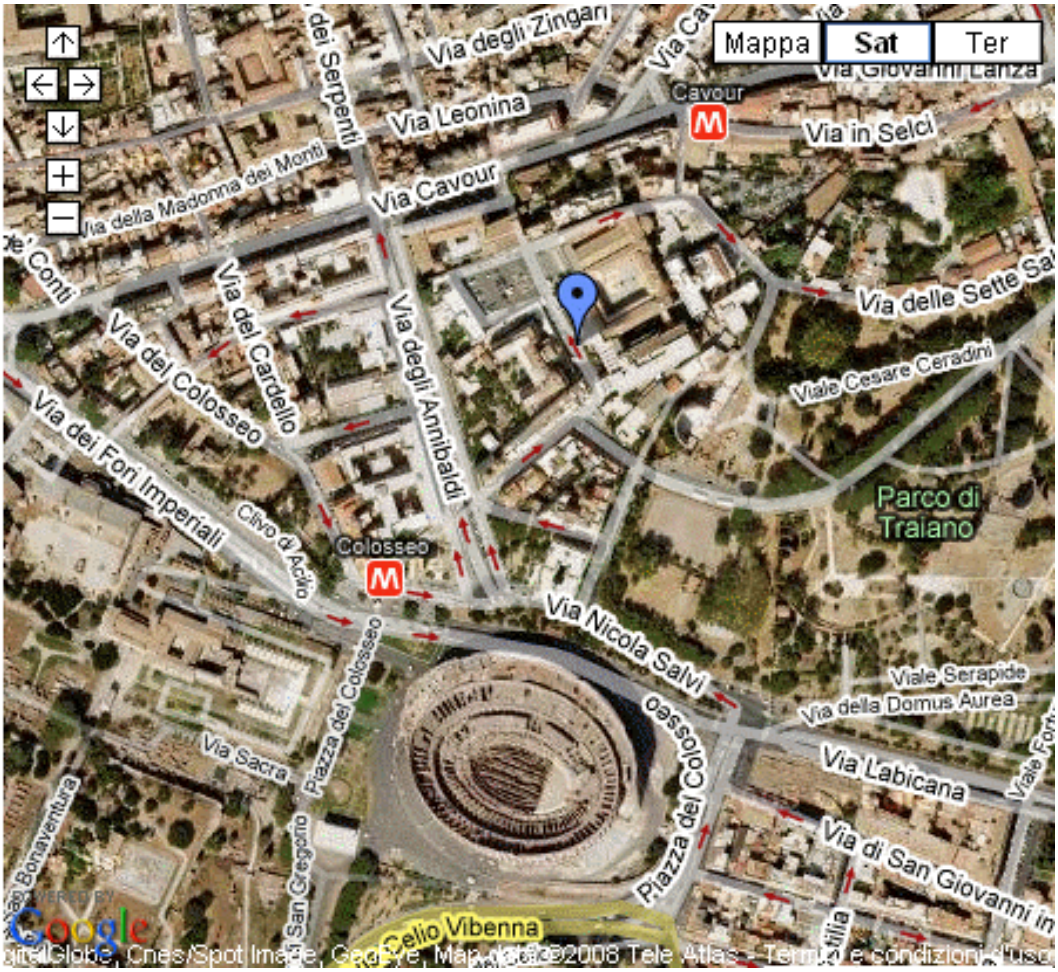
- Many buses stop near the Faculty of Engineering, both on Via Cavour (route "75") and near Colosseo (routes "81", "85" "87" and "30")

By underground–Metro:

- Two underground stations on the Metro B line can be used: the "Cavour Station" on Via Cavour at the foot of Esquilino Hill, and the Colosseo Station near the Colosseo

Maps:

- Sapienza University Campus – Rettorato
- Sapienza Faculty of Engineering



Google Map © – SISFA 2012 Congress Venue Sat View

Travel

- From Ciampino Airport: Buses link airport terminal with Ciampino railway station, located on one side of the airport and served by Italian State Railways (Ferrovie dello Stato – FS); from here you can reach Roma Termini railway station by train after about 20 minutes
- From Rome's "Leonardo da Vinci" International Airport is the fourth in Europe in number of passenger served and Italy's main entrance. This airport was inaugurated in 1960 and is located at Fiumicino, near the ancient mouth of the Tiber. A train service, buses (night service only) and taxis link the airport to downtown Rome
- Train service from Fiumicino Airport: Escalators, people mover systems and elevators link the airport to the railway station. From here you can take a train either to "Roma Termini" (without intermediate stops) or to "Roma Tiburtina" railway stations.
- Trains to Termini station leave the airport every 45 minutes from 6 am to 10 pm and do not stop at intermediate stations
- Trains to Ostiense station run every 20 minutes from 6 am to midnight and stop at Trastevere and Ostiense intermediate stations. Ticket can be also purchased from the automatic machines in cited Stations.
- To reach us get off the train at Ostiense railway station, which is linked to the Piramide underground station on the B line; here you can take on the metrò (direction: toward Rebibbia) and get off at Colosseo station or at Cavour Station (to know how to reach the department
- Buses to Rome (night service only): buses for downtown Rome depart from International Terminal and pick up passengers in front of the Domestic Terminal. The buses run from 1 am to 5 am. Tickets can be bought in the arrivals halls of the International and Domestic Terminals
- Taxi are available in front of both Terminals. Authorized taxies in Rome are yellow or white and have a taximeter inside. Do not trust people who approach you offering taxies: they are more often than not unauthorized and can overcharge

Thus,

- If you are near the *Colosseo* you can take the moving staircase inside the underground station, go up to Largo della Polveriera and then turn on the left toward Piazza S.Pietro in Vincoli
- If you are at the underground station in Via Cavour, to go up to Piazza S. Pietro in Vincoli you can climb the stairs of Via del Monte Polacco or the stairs of Via S. Francesco da Paola
- You may rent a car, with or without driver, at the Leonardo da Vinci Airport or in town (see the Yellow Pages under the heading "Autonoleggio"). You must be at least 21 and, if you rent a car without driver, have a valid driving license for at least 12 months. Remember that:
    - ✓ Like every country, Italy has parking space problems, and often finding a place without being fined is quite difficult at certain hours of the day
    - ✓ Many streets in the historical centre are closed to private cars
    - ✓ Petrol–pumps close ca. between 12.30 pm and 3 pm and after 7 pm
    - ✓ Self service pumps works with Eur (5 minimum) and cards
- The best way to get around in town is by bus, by underground or with the few remaining tram lines
- The underground consists of two lines only (A and B) which do, however, cross the historical centre quite quickly
- Buses run from 5.30 am to midnight. After that the night timetable takes over, as illustrated at the bus stops. Underground service starts at 5.20 am and the last run is at 11.30 pm

- A ticket for the bus and underground lines once stamped is valid for either the metrò or the bus for up 75 minutes. Bus and metro tickets can be purchased at ticket machines, bars, tobacconists', and news–stand or in the Metro stations and bus kiosks. On night buses, tickets can be bought directly on the bus.
- Daily, weekly, and monthly tickets are also available
- Board at the rear of the bus and stamp your ticket in the machine. If you have a daily, weekly or monthly ticket, you can get on at the front door. Get off at the exit in the middle of the bus

Accommodations

- Hotels suggested (see in the website–Map)
- All the sessions will take place at the Faculty of Engineering of Sapienza University which is located in Via Eudossiana 18, very close to the Colosseo, Piazza Venezia, Fori Imperiali and about 1.0 km from the Termini railway Station
- In the following a number of Hotels of various classes, conveniently located in the central area of Rome with respect to the Conference venue and to other zones of the historical center
- To make a reservation please contact directly the hotels
- Due to the large number of participants and the fact that some of the offers can be guaranteed only until a certain date the Organizing Committee strongly suggests to reserve as soon as possible
- Prices are in Euros per night and include all taxes (depending on the class of the hotel) per person per night
- Please click on the link "Distance" to see the location of each hotel and its relative position with respect to the Engineering Faculty or to the closest points of interest

Hotels close to the Congress Venue (as reported in the website)

Hotel	Distance
Grand Hotel Palatino **** Via Cavour 213 –	190 m
Solis Rome *** Via Cavour 311 –	400 m
Ivanhoe ** Via Urbana 50 –	400 m
Fori Imperiali Cavalieri *** Via Frangipane 34 –	450 m
Perugia ** Via del Colosseo 7 –	450 m
Colosseum *** Via Sforza 10 –	550 m
Apollo Rome *** Via dei Serpenti 109 –	550 m
Valle *** Via Cavour 134 –	550 m
Forum **** Via Tor de Conti 25 –	600 m
Canova *** Via Urbana 10 –	600 m
Viminale **** Via Cesare Balbo 31 –	700 m

Mercure Delta **** Via Labicana 144 –	700 m
Antico Palazzo Rospigliosi **** Via Liberiana 21 –	800 m
Lancelot *** Via Capo D'Africa 47 –	850 m
Eurostars International Palace **** Via Nazionale 46 –	950 m
Mediterraneo ****s Via Cavour 15 –	1000 m
Argentina *** Via Cavour 47 –	1000 m
D'Azeglio **** Via Cavour 18 –	1100 m
Universo **** Via Principe Amedeo 5/B –	1100 m
Nord Nuova Roma ***s Via Giovanni Amendola 3 –	1200 m
President **** Via Emanuele Filiberto 173 –	1500 m
Royal Santina **** Via Marsala 22 –	1500 m
Radisson Blu ***** Via Filippo Turati 171 –	1500 m
Novecento *** Via Carlo Emanuele I 12 –	1800 m
Madison *** Via Marsala 60 –	1800 m
Prince Galles **** Via Palestro 72 –	2100 m

Hotels close to St Peter

Hotel	Distance *
Florida ** Via Cola di Rienzo 243 –	800 m
Silla ** Via Silla 3 –	950 m
Giustiniano **** Via Virgilio 1 –	1100 m
Leonardo da Vinci **** Via dei Gracchi 324 –	1400 m

*Distance is to St. Peter

Hotels in other Areas of the Historical Center

Hotel	Distance *
S. Chiara *** Via S. Chiara 21 –	400 m
Accademia *** P.zza Accademia di S. Luca 74 –	650 m
Tritone *** Via del Tritone 210 –	700 m
White **** Via Francesco Crispi 49 –	750 m
Locarno **** Via della Penna 22 –	750 m
Anahi ** Via della Penna 65 –	750 m
Globus *** Viale Ippocrate 119 –	850 m
Vittorio Veneto **** Corso d'Italia 1 –	1400 m
Cine Music **** Via Tuscolana 128 –	1400 m
Holiday Inn Rome San Giovanni *** Via Assisi 53 –	1900 m

*Distance is to Piazza di Spagna or to other famous sites depending on the location of the hotel

– Apartments
– B&B Opportunities

Mr. Francesco Smurra
Mobile telephone: +39 338–45.64.809

Close to the Venue

Address:
via de Capocci 98, angle with *Piazza degli Zingari*, in the heart of "Rione Monti" quarter, few steps from Metro station "Cavour" and Congress Venue (by feet) and Colosseum.

Useful Numbers & Tourist Information

Health	Please consult SISFA 2012 Lobby Desk
Main Emergency Numbers	**Police:** 113 **Carabinieri (Military Police):** 112 **Municipal Police:** 067691 **Fire Service:** 115 **Ambulance:** 118 **Croce Bianca Italiana:** 068181011 **Croce Blu Europea:** 0672900245 **Croce Medica Italiana:** 0623231333 **Croce Rossa Italiana:** 065510 **Medis:** 066242413 **Nuova Croce Rosa Romana:** 0630814791 **Nuova Croce Verde Romana:** 0624302222 **Roma Soccorso:** 0687149815 **Doctors:** 0658201030 **ACI (Highway Emergency Service):** 116 **Corpo Forestale dello Stato:** 1515 **Public Safety Rome:** 800854854 0667109200/9206 **Lost and found** **Busses and trams:** 0646951 **Metro A and Metro B:** 0667693214 email: oggettismarriti@comune.roma.it (Monday – Friday: 8.30 a.m. – 1 p.m.; Thursday: 8.30 a.m. – 5 p.m. closed Sundays and Holidays)
Main Airlines Numbers	**Air France:** 0648718 **Alitalia Information:** 0665643 **Alitalia National Booking:** 0665641 **Alitalia International Booking:** 0665642 **American Airlines:** 0642741240 **British Airways:** 147812266 **Canadian Airlines:** 0665557117 **Continental:** 0666053030 **Japan Airlines:** 0665955681 **Klm:** 066529286 **Lufthansa:** 0665954004 **Qantas:** 0665010146 **Twa:** 064724241
Main Taxi	**Cosmo:** 0688177 **Romana:** 063570 **La Capitale:** 064994 **Pronto Taxi:** 066645 **Tevere:** 064157 **Ostia Lido:** 065601646

Main Tourist Information

Tourist Information 7/7 from 9.00 am to 9.00 pm

0636004399

Tourist Board
Via Parigi 5
0648899255

Call Center
0636004399

Castel Sant'Angelo
Piazza Pia
0668809707

Fori Imperiali
Piazza del Tempio della Pace
0669924307

Piazza di Spagna
Largo Goldoni
0668136061

Piazza Navona
Piazza delle Cinque Lune
0668809240

Trastevere
Piazza Sonnino
0658333457

San Giovanni
Piazza S. Giovanni in Laterano
0677203535

Santa Maria Maggiore
Via dell' Olmata
0647880294

Stazione Termini
Piazza dei Cinquecento
0647825194

Via Nazionale
Palazzo delle Esposizioni
0647824525

Main Public transport	**Bus–Atac:** 800431784 **Italian Railway:** 1478888088 892021 www.trenitalia.it **Fiumicino Airport:** 0665951 **Ciampino Airport:** 06794941
Main downtown area close to The Venue	**Rione Alto. Cavour Metro B station:** Pizzeria, Restaurant, wine bar (famous) Via Panisperna, Via dei Serpenti, etc..
Main Museum	**[It is better to phone beforehand for up–to–date information; Italian time display]** **Amphitheatrum Flavium/Colosseum** Piazza del Colosseo, tel 067004261. Same opening hours as the roman Forum. **Roman Forum, Palatine, Basilica of Maxentius, Palatine Antiquarium and Loggia Mattei** Three entrances: 1) from ortale del Vignola near the Arch of Constantine, 2) from the Arch of Titus, 3) from Largo Romolo e Remo 1, tel. 066990110. Open from Tues–Sat 9.00–one hour before sunset; Mondays and holidays 9.00–14.00. Guided Tours may be booked by calling 0639080730. **Trajan's Markets and Imperial Forums** Via IV November 94 and Via dei Fori Imperiali, tel. 066790048. **Domus Aurea** Emperor Nero's residence with its elegant cycles of paintings and frescoes is open to visitors Via della Domus Aurea (Colle Oppio Gardens), tel. 0639749907. Open every day of the week from 9.00 to 20.00, but visits must be booked in advance. **Villa Giulia National Etruscan Museums** The Museum is located in the villa which belonged to Pope Julius III. It mostly hosts archaeological finds of the pre–Roman communities which lived in Latium in southern Etruria and Umbria. Piazzale di Villa Giulia 9, tel. 063226571. Open 9.00–19.00; holidays 9.00–14.00; closed on Mondays. **Pigorini National Prehistoric and Ethnographic Museum** Transferred here from the historical premises of the Collegio Romano, the museum houses a section dedicate to Latium, an ethnographic section and permanent thematic exhibitions. Piazza G. Marconi 14, tel. 06549521. For school visits please call 0654952248. Open 9.00–14.00; holidays 9.00–13.00; closed on Mondays**.**

Ara Pacis Augustae
The monumental altar was inaugurated on 30 January of 9 BC to celebrate Augustus vicories in Gaul and Spain and the advent of peace in the Empire. Lungotevere in Augusta, tel. 0636003471. Open 9.00–19.00; holidays 9.00–13.00; closed on Mondays.

Mausoleum of Augustus
Dynastic tomb of the Emperor and his family. It was built by Augustus in AD 29. – Piazza Augusto Imperatore. Please call 0667103819 to visit the mausoleum.

Barracco Museum
The museum houses a collection of ancient sculptures, donated to the Municipality of Rome in 1905. Corso Vittorio Emanuele II 158, tel. 0668806848. Open Tues–Sat 9.00–19.00; holidays 9.00–13.00; closed on Mondays.

Diocletian Museum and Baths
Archaeological finds of Roman age (mostly imperial). Viale E. De Nicola 79, tel. 064882298. Closed on Mondays**.**

Planetarium (Aula Ottagona)
Via Romita, tel. 064870690. Open 9.00–13.00; holidays 9.00–14.00; closed on Mondays.

Palace of Maximus
This palace hosts some collections which were once on display in the *Museo Nazionale Romano*, namely the section of ancient art (archaeological finds of Roman age from the 2nd century BC to AD 4), including statues, bronzes, frescoes and mosaics; the numismatic section, including ancient, medieval and modern coins, coins reserves, archaeological finds, seals, medals, gems and jewels of the classical age. Piazza dei Cinquecento 67, tel. 0648903500. Open 9.00–19.00; holidays 9.00–14.00; closed on Mondays.

Museum of Roman Civilization
Plaster casts of statues, reliefs and inscriptions; models of Roman buildings and of the provinces of the Roman Empire, replicas of objects of ancient Rome's everyday life. Worth to be remembered are: the large model of Imperial Rome (to a scale of 1:250), the model of archaic Rome (to a scale 0f 1:1000) and the casts of the Trajan's Column. – Piazza G. Agnelli 10, tel. 065926041. Open 9.00–19.00; holidays 9.00–13.00; closed on Mondays.

Caracalla's Baths
Monumental complex of thermal baths of imperial age. – Via delle Terme di Caracalla, tel. 065758626. Open 9.00–one hour before sunset; Mondays and holidays 9.00–14.00.

Capitoline Museums
Piazza del Campidoglio, tel. 0667102071. Open 9.00–19.00; holidays 9.00–13.00; closed on Mondays.

Art Center (at the former Montemartini power plant)
Ancient sculptures from excavations carried out in the late 1800 and in the 1930s are juxtaposed to the old equipment of Rome's firts power plant (1912). Via Ostiense 106, tel. 065748030. Open Tue–Fri 10.00–18.00; Sat and Sun 10.00–19.00; closed on Mondays.

Pantheon
In 27 BC, the Pantheon was a pagan temple. In AD 608, after several reworking, it was consecrated by Pope Boniface IV to the Virgin Mary and to all the martyrs. Since 1870, it has been the Sacrarium of Italian Kings. – Piazza della Rotonda, tel. 0668300230. Open 9.00–18.30; holidays 9.00–13.00.

Borghese Gallery and Museum
Cardinal Scipione Borghese, the nephew of Pope Paul V (1605–1620) had his residence in this palace which was redecorated and refurnished in the 18th century. It houses the Borghese family's collection, including sculptures of the classical age and of the 16th to the 19th century (including works by Bernini and Canova), as well as paintings of the 15th century. Piazzale S. Borghese 5, tel. 068548577. Booking is required to visit the museum, please call 063281101. Open Tues–Sat 9.00–19.00; Sundays and holidays 9.00–13.00; closed on Mondays.

Doria Pamphilj Gallery
The Doria Pamphilj Palace, one of the most outstanding nobiliary palaces in Rome, was built in the 15th century and completed later. Visitors can enjoy the rich private art collection, the meeting, entertaining and banqueting halls and a few rooms of the private apartment. Piazza del Collegio Romano 2, tel. 066797323. Open 10.00–17.00; closed on Thursday. Apartments can be visited from 10.30 – 12.30; closed on January 1, Easter Sunday, May 1, November 1 and Christmas.

Altemps Palace
Hosts the remarkable Luovisi collection. Via di Sant'Apollinare 8, tel. 066833759. Open 9.00–19.00; holidays 9.00–14.00; closed on Mondays.

Palazzo Venezia National Museum
Wooden, terracotta and marble sculptures, small bronzes and silverware. Via del Plebiscito 118, tel. 0669994243. Open 9.00–14.00; closed on Mondays.

Barberini Palace
Lippi, Raffaello, Caravaggio, Bernini and much more. Via Quattro Fontane 13, tel. 064814591. Open 9.00–19.00; closed on Mondays**.**

Corsini Palace
Works by Angelico, Rubens, Poussin. Via della Lungara 10, tel. 0668802323. Open Tues–Fri 9.00–19.00; Sat 9.00–14.00; holidays 9.00–13.00; closed Mondays.

Castel Sant'Angelo National Museum
It was the Emperor Hadrian's tomb. In the Middle Ages it became a fortress, a prison and a papal residence. Lungotevere Castello 50, tel. 066819111. Open 9.00–19.00; closed on Mondays.

Vatican Museums
Sistine Chapel, Raffaello Rooms and Loggia – Vatican City – Viale Vaticano, tel. 0669884947 0669883333. Open Mon–Fri 8.45–1.45; closed on Sundays (except last Sundays of the month: entrance free); closed on religious holidays. Please call for confirmation of opening hours.

National Gallery of Modern and Contemporary
Art It hosts one of the major collections of paintings, sculptures and graphics, especially by Italian artists of the 19th to the 20th century. The Gallery also houses a rich library and a specialize archive. Viale delle Belle Arti 131, tel. 06322981. Open 9.00–19.00; closed on Mondays.

Municipal Gallery of Modern and Contemporary Art
Via Cagliari 29, tel. 068844930. Open 9.00–19.00; holidays 9.00–14.00; closed on Mondays.

Napoleonic Museum
Via Zanardelli 1, tel. 0668806286. Open 9.00–19.00; holidays 9.00–13.00; closed on Mondays.

National Museum of Oriental Art Houses the most important Italian collection of oriental art
Via Merulana 248, tel. 064874415. Open 9.00–14.00; Tues and Thurs 9.00–19.00; holidays 9.00–13.00; closed on 1st and 3rd Monday of the month.

Palazzo delle Esposizioni
Modern and prestigious venue for international level exhibitions. Via Nazionale 194, tel. 064885465. For info and bookings call 064645903. Open 10.00–21.00; closed on Tue.

Deadlines Registration

- Status Early registration and Discounted Payment Congress Fees before 31st May 2012: CLOSED
- Status Extended Discounted Payment Congress Fees best before 10th June 2012: CLOSED

- Status Late registration and Full Payment Congress Fees (180 EUR (165 EUR IF APPLICABLE)) from 11st June to 21st August:
  CLOSED

- Registration and submission deadline is 21st August 2012. After this date, no registration and no submission, no at desk registrations–payments are allowed.

Schedule

Official Congress Oral Language

- English
- Italian

Presentation

- All accepted abstracts have been refereed.
- Plenary: 45 minutes Invited talks: 30 minutes Contributes sessions: 20 minutes.
- It is mandatory that electronic presentations (e.g., power point, video, overhead projector, etc...) must be into English language.
- Oral language, preferably into English, can be also into Italian.
- It is mandatory that oral presentations without any electronic support must be into English language.

I.T. Equipment

- Notebooks, USB 2.0; Office 97–2003x, Winzip, Acrobat Reader, Projector for computer, Overhead projector, Printing

Thursday, 27 September 2012
Venue sessions: Plenary *Sala del Chiostro* Room (200 s.)
***Sala degli Affreschi* Room (60 s.)**
h. 8.30 am –11.00 pm

September	Thursday 27, 2012	SISFA Congress 2012, Roma
(8.30–daily)	am	*Welcome Congress: arrival, reception & Helpdesk at Faculty of Engineering La Sapienza* (Anna Lukešová)
(9.00–9.25)		*Sala del Chiostro* room Opening Act Chairpersons: Danilo Capecchi and Raffaele Pisano Fabrizio Vestroni, Dean of the Faculty of Engineering La Sapienza.
(9.30–10.15)		**Plenary Speaker: Jean DHOMBRES (France)** *Conflicting issues for mathematics at the Ecole polytechnique during its first forty years of existence: the role of Lazare Carnot* Chair: Raffaele Pisano (France/Czech Republic)
(10.30–10.40)	Coffee Break	
(10.45–11.30)		**Plenary Speaker: Walter NOLL (United States of America)** *Physics and Mathematics without Coordinates* Chair: Giuseppe Ruta (Italy)
(11.45–12.15)		**Invited Guest Physics Lecture on Higgs Boson: Aleandro NISATI (Italy)** *Search of the Higgs Boson at the Large Hadron Collider* Chair: Salvo D'Agostino (Italy)
(12.30–1.00)		**Invited Talk: Agamenon Rodrigues OLIVEIRA (Brazil)** *The Role of the Concept of Work in the Development of Applied Mechanics* Chair: Marco Ceccarelli (Italy)
(1.00–1.45)	Lunch break	
(2.00–2.30)	pm	**Invited Talk: Mauro FRANCAVIGLIA (Italy)** *"Palatini's Method" offers a new view to non–euclidean geometry* Chair: Flavia Marcacci (Italy)
(2.45–5.05)		Contributes session: 1. Marco Mamone Capria (I) and Maria Grazia Manini (I). *Attributions and misattributions at the origins of special relativity: Minkowski's "Lorentz's theorem".* 2. Salvo D'Agostino (I). *Maxwell's dynamical approach to electromagnetism and kinetic theory* 3. Marcella Palese (I). *Field equations or conservation laws?* 4. Salvatore Esposito (I) and Adele Naddeo (I). *The helium atom and the Majorana solutions of the two–electron problem.* 5. Antonino Drago (I). *Black body theory: the insufficiency of Planck's Calculations.* 6. Pietro Di Mauro (I). *Dualism wave – Particle and Principle of Relativity.* 7. Roberto Lalli (U.S.A.). *Confirming SRT despite himself: Ives' Neo–Lorentzian theory and the Ives–Stilwell experiment (1937–1941).*
(5.05–5.15)	Coffee Break	

(5.15–7.45)	**Parallel–contributes sessions**	
	***Sala del Chiostro* room**	***Sala degli Affreschi* room**
	Invited Talk and Chair: Salvatore ESPOSITO[5] (Italy) *Spreading Scientific Philosophies with Instruments: The Case of Atwood's Machine*[6] Contributes session: 1. Dimitra Giannara (GR). *Natural sciences at the service of Narratology: exploring the structure of Pirandello's novels according to the Moebius ring* 2. Giuseppe Boscarino (I). *The ontological levels of scientific theories and technical, ethical and educational progress.* 3. Antonino Drago (I) and Raffaele Pisano (I). *The thermodynamics and the Principle of Virtual Velocities*. 4. Leonardo Gariboldi (I). *Physics Instruments for Polar Expeditions: The case of the 1928 Italia–Airship Expedition.* 5. Luca Guzzardi (I). *Energy, space and metaphysics. Ernst Mach's interpretation of energy conservation as the principle of causality*. 6. Ugo Besson (I). *The cooling law and the definition of a temperature scale, from Newton to Dalton and Dulong–Petit*.	**Invited Talk and Chair: Steffen DUCHEYNE[7] (Belgium)** *Reassessing W. J.'s Gravesande's appropriation of Newton's methodology* Contributes session: 1. Valentina Zaffino (I). *Giordano Bruno and the philosophical use of the proportional eight spikes compass*. 2. Enrico Giannetto (I). *Thomas Harriot, modern science and inertia.* 3. Epaminondas Vampoulis (Gr). *Galileo's use of practical knowledge.* 4. Vincenzo Cioci (I) and Antonino Drago (I). *The improvement of Haret's social mechanics* 5. Manolis Kartsonakis (Gr). *Tradition and innovation in 13th century natural philosophy: Nikephorus Blemmydes' "Epitomi Fysikis"*. 6. Salvatore D'Agostino (I). *Engineering history in Italy.*
(8.30) **(9.00)**	eve Special events: Concert & Evening Plenary Session Chairs: Danilo Capecchi and Raffaele Pisano **Concert: Claudio BUCCARELLA (Italy) and Giulia CAPECCHI (Italy)** *Concert for Two Violins* ***"General Faraday Lecture"*: Frank A.J.L. JAMES (United Kingdom)** *Michael Faraday and Invisible Forces*	
(11.00)	eve Closing Thursday session No others planned activities Possible later social meeting in Roma area Cavour Metro	

[5] Introduced by Anna Lukešová (Cz).
[6] With Edvige Schettino (I).
[7] Introduced by Anna Lukešová (Cz).

Friday, 28 September 2012
Venue sessions: *Plenary Room 1* (200 s.)
***Sala degli Affreschi* Room (60 s.)**
h. 8.30 am – 7.45 pm [11.00 pm]

September	Friday 28, 2012	SISFA Congress 2012, Roma
(8.30–daily)	am	*Welcome Congress: arrival, reception & Helpdesk at Faculty of Engineering La Sapienza* (Anna Lukešová)
		Plenary Room 1
(8.30–9.15)		**Plenary session: Radim KOČANDRLE (Czech Republic)** *The Earth Floats Unsupported in Space* Chair: Ludmila Dostálová (Czech Republic)
(9.30–10.15)		**Plenary Speaker: Marco CECCARELLI (Italy)** *An Outline of History of Mechanism Design in Servicing Science* Chair: Danilo Capecchi (Italy)
(10.30–10.40)	Coffee Break	
(10.45–12.55)		**Invited Talk and Chair:Young S. KIM[8] (United States of America)** *Historical Approach to Physics according to Kant, Einstein, and Hegel.* Contributes session: 1. Francesco Maria Ferrari (I). *From science to philosophy: A. N. Whitehead and the notion of "Process".* 2. Piotr Flin (Pl), Hilmar Duerbeck (B) and Włodzimierz Godłowski (Pl). *Ludwik Silberstein.* 3. Antonino Drago (I). *The emerging of two options from Einstein's first paper on quanta.* 4. Silvia De Bianchi (I). *What can we learn from riddles and paradoxes? An integrated HPS approach to Kant's cosmology.* 5. Alessandra D'Amico Finardi (I). *The planimeters.* 6. Enrico Gasco (I). *Semantic spaces and History of Physics: a case study.*
(1.00–1.45)	Lunch Break	

[8] Introduced by Salvatore Esposito (I).

(1.46–1.59)
(2.00–4.25)

pm **Photo SISFA 2012 Session**

Parallel–contributes sessions

***Sala degli Affreschi* room**

Invited Talk and Chair: Liliane ALFONSI[9] (France)

A turning point in French officers training: Mechanics in the mathematics course of Étienne Bézout (1730–1783).

Contributes session:

1. Marcella Giulia Lorenzi (I), Mauro Francaviglia (I) and Luciana De Rose (I). *Stars, numbers and symbols in the Fresco of Marino Mithraeum.*
2. Arcangelo Rossi (I). *Developments of English science and scientific popularization between '700 and '800.*
3. Danilo Capecchi (I) and Giuseppe Ruta (I). *The polytechnic schools in germany in the 19th century.*
4. Raffaele Pisano (I). *On the emergency of physical and mathematical objects in the 19th century.*
5. Stefano Bordoni (I). *From scientia to scientia: Salvo D'Agostino's history of physics and the tradition of theoretical physics.*

Plenary Room 1

Invited Talk: Daniel ŠPELDA (Czech Republic)

Early modern histories of astronomy: On searching for antediluvian astronomy and vision of astronomical progress.

Chair: Massimo Mazzoni (Italy)
Contributes session:

1. Flavia Marcacci (I). *World systems compared: manuals of astronomical instruments between Nicholas Bion and minor artisans in XVII century.*
2. Fernando B. Figueiredo (Pt). *Explorating the beginning of the astronomical scientific activity of the astronomical observatory of the university of Coimbra (1772–1813).*
3. Enzo Bonacci (I). *The "Livio Gratton" planetarium in Latina (Italy).*
4. Matteo Realdi (E). *The tortuous path to high mountain astrophysics. The construction of a Jesuit observatory in the Sierra Nevada (1965–1969).*
5. Federica Maffioli (I) and Gianfranco Medici (I). *Paolo de Saint Robert* and *Receding of the glaciers*

(4.30–4.40)
(4.45–6.05)

Coffee Break

***Sala degli Affreschi* room**

Continuous from previous contributes session
Chair: Liliane Alfonsi (France)

6. Helen Fragaki (Fr). *Court engineering in Ptolemaic Alexandria.*
7. Marco Taddia (I). *Beaten by a Nose. How did Félix Bernard Contribute to the Beer's Law of Colorimetry?*
8. Arturo Gallozzi (I). *... may God protect you from lightning ...*
9. Angelo Pagano (I). *The laws of statics in the work of Archimedes as formalized by Salvatore Notarrigo.*

Plenary Room 1

Continuous from previous contributes session
Chair: Massimo Mazzoni (Italy)

6. Gianfranco Medici (I) and Federica Maffioli (I). *Paolo de Saint Robert and the True meaning of a tercet of Dante*
7. Fabrizio Bònoli (I), Elena Cenacchi (I), Agnese Mandrino (I), Raffaella Stasi (I), Diego Zuccato (I). *Digitization and online publishing of the whole historical archive of the department of astronomy of the university of Bologna.*
8. Paolo Bussotti (I). *The Concept of Force in Johannes Kepler.*
9. Maria Luisa Tuscano (I). *The scientific work of Antonio Maria Jaci in Messina.*

[9] Introduced by Anna Lukešová (Cz).

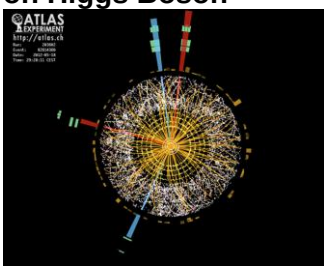
(6.05–6.40)		***Plenary Room 1*** Salvo D'Agostino Tribute Special Session Chair: Arcangelo Rossi (Italy) 1. Stefano Bordoni (I). *Salvo D'Agostino: Physics and history, tradition and Innovation.* 2. Salvo D'Agostino (I): *Reply* 3. Free Debate: Rossi (I), Bevilacqua (I)
(6.40–7.45)		***Plenary Room 1*** **General SISFA Assembly**
(9.00)	eve	Congress dinner *Taverna Urbana* Restaurant http://www.ristorantetavernaurbana.com Via Urbana 137, Roma, Tel.: +39 06–48 84 439 Preliminary Reservation is mandatory to: sisfa2012@gmail.com The dinners costs 40 Euros directly at help desk SISFA 2012 Congress
(11.00)		Closing Friday session No others planned activities Possible later social meeting in Roma area Cavour Metro

Saturday, 29 September 2012
Venue sessions: *Sala degli Affreschi* Room (60 s.)
h. 8.00 am – 1.30 pm

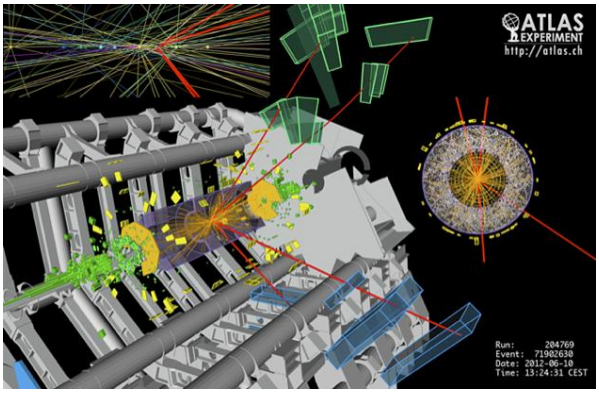
September	Saturday 29, 2012 SISFA Congress 2012, Roma
(8.00–1.00)	am *Welcome Congress: arrival, reception & Helpdesk at Faculty of Engineering La Sapienza* (Anna Lukešová)
(8.00–8.45)	***Sala degli Affreschi* room** **Plenary Speaker: Peter HEERING (Germany)** *The analysis of historical experiment with the replication method* Chair: Roberto Mantovani (Italy)
(9.00–10.20)	Contribute session – Chair: Antonio di Meo (Italy) 1. Roberto Mantovani (I). *The discovered Archive: the scientific papers of Alessandro Serpieri.* 2. Fausto Casi (I). *From Adam Heroldt to Lusuerg Builders of scientific instruments in Roma 17th–19th.* 3. Giorgio Mirandola (I). *The metallurgical microscope* 4. Lucio Fregonese (I). *Past and Present Classifications of Electroscopes and Electrometers: The interplay between Structural and Conceptual Criteria*
(10.30–10.40)	Coffee Break
(10.40–1.10)	**Invited Talk: Michela CIGOLA (Italy)** *The Qiqi tushuo by the jesuit Johann Schreck: europeans Theatra Machinarum in China in the XVIth century.* Chair: Anna Lukešová (Czech Republic) Contributes session: Chair: Danilo Capecchi (Italy) 1. Rossella Fucci (I). *Symmetries in Newtonian mechanics.* 2. Cesare Tocci (I). *Art and science of building in the work of Giuseppe Damiani Almeyda.* 3. Stefano Brusaporci (I) and Mario Centofanti (I). *Surveying methods and instruments in the treatises of leronimo Pico Fonticulano (1541–1596).* 4. Emanuela Chiavoni (I). *The drawings concerning artistic techniques in the Diderot's Encyclopedia.* 5. Antonella Salucci (I). *Techniques and methods of Italian architectural drawings of the early xx century.* 6. Emanuele Zamperini (I). *Structural analysis of Timber Trusses (1860–1940).* 7. Giancarlo Scalera (I). *The variable radius cartography – history and perspectives of a new discipline.*
(1.15–1.30)	Closing Saturday session Chairs: Danilo Capecchi and Raffaele Pisano Closing Congress Acts Organizing Committee
(1.30)	Free Lunch & Greetings No others planned activities

Special Events

Invited Guest Physics Lecture on Higgs Boson[10]



Candidate Higgs decay to four electrons recorded by ATLAS in 2012



Candidate Higgs Decay to four muons recorded by ATLAS in 2012

2012, 27 September h. 11.45–12.15 am

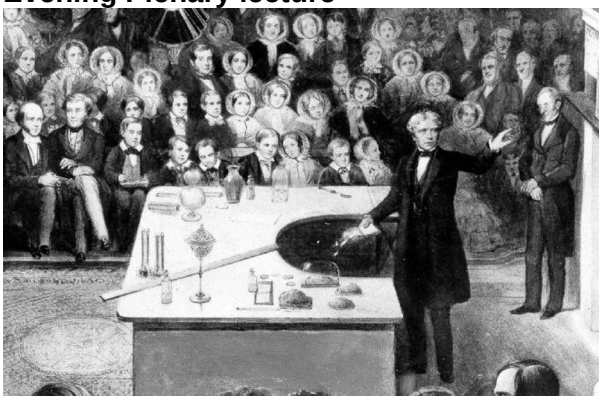
Invited Guest Physics Lecture
Aleandro NISATI (*I.N.F.N. Sezione di Roma–CERN*, Italy/Switzerland)
Search of the Higgs boson at the Large Hadron Collider.
On 4 July 2012, the *ATLAS* experiment presented a preview of its updated results on the search for the Higgs Boson. The results were shown at a seminar held jointly at *CERN* and via video link at *ICHEP*, the International Conference for High Energy Physics in Melbourne, Australia. At *CERN*, preliminary results were presented to scientists on site and via webcast to their colleagues located in hundreds of institutions around the world. Aleandro Nisati is *ATLAS Physics coordinator.*

Concert

2012, 27 September h. 8.30 pm
Concert for two violins
Maestro Claudio BUCCARELLA (*I Musici*) and Giulia CAPECCHI (*Conservatorio Santa Cecillia*).
Chiostro, Faculty of Engineering, University of Roma La Sapienza

[10] Images credit: http://www.atlas.ch/news/2012/latest-results-from-higgs-search.html

Evening Plenary lecture



1856. Michael Faraday presenting a *Christmas Lecture*

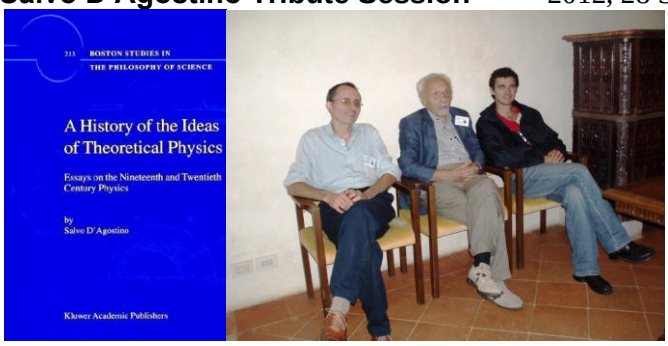
2012, 27 September h. 9 pm
General Faraday Lecture
Frank A.J.L. JAMES
(The Royal Institution of Great Britain, U.K)
Michael Faraday and Indivisible Forces.

The "Faraday Lecture" is an important lecture in UK. Its objective is to present science and correlated technologies in an exciting manner (like Michael Faraday used to do) talking to large audience and exploring the fascinating world of pure and applied sciences. Several *Faraday Memorial lectures* were presented in the past.

Events at *Chiostro*, Faculty of Engineering, University of Roma La Sapienza

Salvo D'Agostino Tribute Session

2012, 28 September h. 6.05 pm–6.40 pm



XXXIX SISFA Congress Galileo's house Arcetri
(2009, Arcetri, Firenze, Italy)
(from left side: S. Bordoni, S. D'Agostino, R. Pisano)

Chair: Arcangelo ROSSI (Italy)
Stefano BORDONI (I). *Salvo D'Agostino: Physics and History, Tradition And Innovation.*
Salvo D'AGOSTINO (I): *Reply*
Free debate: ROSSI, BEVILACQUA

Ancient and Rare Books Exhibition

Permanent during the 3–days congress
The Library of the Faculty of Engineering "Giovanni Boaga" provides a large exhibition of panels and books concerning 18th–19th century. It is organized at *Chiostro* area. The event and Library are free for SISFA 2012 participants. It is localized in the same building as the Congress venue, *Chiostro* area.

A special video on ancient and rare books which belong to University of Roma La Sapienza will be provided on 27 and 28 September 2012.

Ancient and Rare Measurements Instruments Exhibition

2012 27 September

An interesting private collection exhibition regarding measurement instruments by mathematician Antonio Salmeri (*Società Italiana di Storia delle Matematiche*) and Marcello Salmeri (University of Roma 2, Tor Vergata) is provided at SISFA 2012: *Slide rules and nomography: the art of measure.* The exhibition shows ancient and more recent instruments such as adding machines and callipers, linear cylindrical or circular slide–rules, and nomograms. The collection has origin in several parts in the world. It is related to history of mathematics and technology such as the art of calculation: i.e., Ancient Orient, the invention of the logarithms, the astronomic navigation and its earlier methods etc. It localized in the same building as the Congress venue.

Panel session

Permanent during the 3–days congress
Posters Panel Session is provided by some SISFA 2012 participants.
It is localized in the same building as the Congress venue, *Chiostro* Area.

Congress dinner

2012, 28 September h. 9.00 pm
Taverna Urbana Restaurant
http://www.ristorantetavernaurbana.com
Via Urbana 137, Roma
Tel.: +39 06–48 84 439

Preliminary Reservation is mandatory to: sisfa2012@gmail.com

The dinners costs 40 Euros directly at help desk SISFA 2012 Congress

International Proceedings SISFA 2012

Title:

Physics, Astronomy and Engineering. Critical Problems in the History of Science. *International 32nd Congress for The SISFA–Italian Society of Historians of Physics and Astronomy*

Editors: Raffaele Pisano, Danilo Capecchi and Anna Lukešová

Publisher: *Scientia Socialis UAB* & *Scientific Methodical Centre Scientia Educologica* Press Šiauliai University, Lithuania

City: Šiauliai, Lithuania

Year: 2013

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Plenary papers: 13–15 pages per scholar included references
Contributors: 8–10 pages per scholar included references
Analytical Index (names and subjects)
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Short description–affiliations of the Editors

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Deadline

- ✓ Deadline submission proceedings-full paper: 31st January 2013

Papers submitted

- ✓ The papers are expected to be revised (in the contents, editing and English) prior to submission to SISFA 2012 Proceedings.
- ✓ An accepted abstract-contribute at SISFA 2012 does not mean that the related paper should be automatically accepted for the publication in its proceedings.
- ✓ All submitted papers which meet the criteria of originality and quality will be peer–reviewed for the publication.

The Publisher provides 30 % discount for members of the following international institutions[11]:

- ✓ Accademia Nazionale dei Lincei
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- ✓ Biblioteca "G. Boaga", Facoltà di Ingegneria, Università di Roma La Sapienza
- ✓ Centro di Ricerca Interuniversitario di Filosofia e Fondamenti della Fisica
- ✓ Dipartimento di Scienze di Base e Fondamenti, Urbino
- ✓ ESHS, European Society for the History of Science
- ✓ Facoltà di Ingegneria, Università di Roma La Sapienza
- ✓ Istituto Superiore "Paolo Baffi", Fiumicino

[11] Alphabetical order.

- ✓ Museo dei Mezzi di Comunicazione di Arezzo
- ✓ RCTHS, Research Centre for the Theory and History of Science
- ✓ SAIt, Società Astronomica Italiana già degli spettroscopisti
- ✓ SISFA, Società Italiana degli Storici della Fisica e dell'Astronomia

The Publisher provides 20% discount for members of the following international institutions[12]**:**

- ✓ Académie des Sciences–Institute de France
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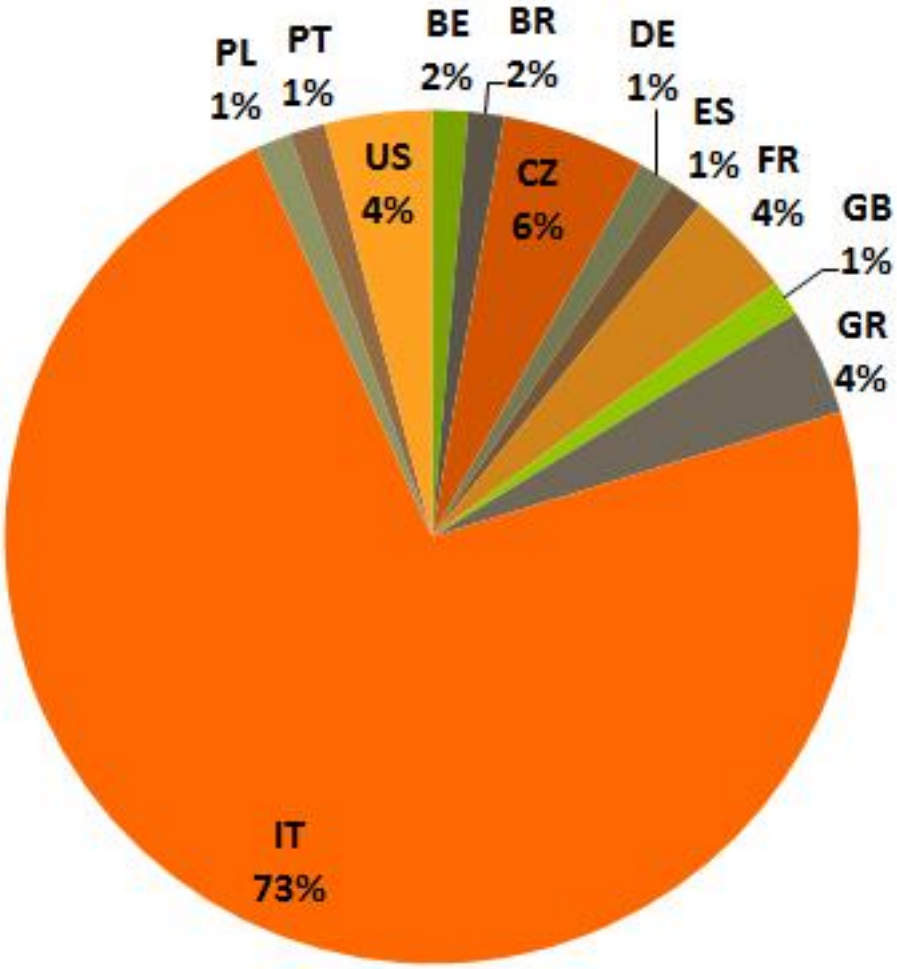
- ✓ AIF, Associazione Italiana per l'Insegnamento della Fisica
- ✓ AMS, American mathematical society
- ✓ ASL, International Association of Symbolic Logic
- ✓ Associazione Culturale Torre del Conte Paolo Ballada de Saint Robert
- ✓ BSHS, British Society for the History of Science
- ✓ CAK, Centre Alexandre Koyré, Paris
- ✓ CAPHI, Centre Atlantique de Philosophie
- ✓ CE&HPC, Bulgarian Society for the chemistry education and history and philosophy of chemistry
- ✓ Centaurs, Wiley Publishing Company
- ✓ CERN, The European Organization for Nuclear Research
- ✓ CFV, Centre François Viète Épistémologie, Histoire des Sciences et des Techniques.
- ✓ CIRPHLES, Ecole Normale Supérieure Paris
- ✓ CNRS, Centre National de la Recherche Scientifique
- ✓ CREA, Centre de recherché en Epistémologie Appliquée, Ecole Polytechnique Paris
- ✓ David Publishing Company
- ✓ Department of Mathematical Sciences, Pittsburgh
- ✓ Dipartimento dei Scienza della Persona, University of Bergamo
- ✓ EHESS, Ecole des Hautes Etudes en Sciences Sociale, Paris
- ✓ EPS, European Society of Physics
- ✓ GHDSO, Laboratoire Groupe d'Histoire et de Diffusion des Sciences d'Orsay, Paris–Sud
- ✓ HOPOS, International Society for the History of Philosophy of Science
- ✓ HSS, History of Science Society
- ✓ I.N.F.N., Istituto Nazionale di Fisica Nucleare
- ✓ IHPTS, Institut d'Histoire et de Philosophie des Sciences et des Techniques, Université Paris 1
- ✓ Institute of Physics and Chemistry and its Didactics, Flensburg
- ✓ Laboratoire Histoire des sciences – Philosophie Archives Poincaré, Université de Nancy 2
- ✓ LARM, Laboratory of Robotics and Mechatronics, Cassino
- ✓ MATHESIS, Sociatà Italiana delle Scienze Matematiche e Fisiche
- ✓ SFHST, Société Française d'Historie des Sciences et des Techniques
- ✓ SIF, Società Italiana di Fisica
- ✓ SISM, Sociatà Italiana di Storia della Matematiche
- ✓ SISS, Società Italiana di Soria della Scienza
- ✓ The Royal Institution of Great Britain

[12] *Ibidem*.

Attendance SISFA 2012 Participants



74 Registered participants
12 Countries
69 International individual talks

	Country	Attendance SISFA 2012 Participants[13]	Abstract title (and co–authors)	Participants only
1.	IT	Adele Naddeo (University of Salerno)	The Helium Atom and the Majorana Solutions of the Two–Electron Problem (with Salvatore Esposito)	
2.	BR	Agamenon Rodrigues Oliveira (Polytechnic School of Rio de Janeiro, Federal University of Rio de Janeiro)	The Role of the Concept of Work in the Development of Applied Mechanics	
3.	IT	Alessandra D'Amico Finardi (University of Bergamo)	The planimeters	
4.		Aleandro Nisati (I.N.F.N. Sezione di Roma/CERN)	Search of the Higgs Boson at the Large Hadron Collider	
5.	IT	Angelo Pagano (I.N.F.N. Sezione di Catania)	The Laws of Statics in the Work of Archimedes as formalized by Salvatore Notarrigo	
6.	CZ			Anna Lukesova (University of West Bohemia in Pilsen)
7.	IT	Antonella Salucci (University "Gabriele d'Annunzio" of Chieti – Pescara)	Techniques and Methods of Italian Architectural Drawings of the Early XX Century	
8.	IT	Antonino Drago (University of Pisa)	The Emerging of Two Options from Einstein's First Paper on Quanta	
9.	IT	Antonino Drago (University of Pisa)	Black Body Theory: The Insufficiency of Planck's Calculations	
10.	IT	Antonino Drago (University of Pisa)	The Thermodynamics and the Principle of Virtual Velocities (with Raffaele Pisano)	
11.	IT			Antonio Di Meo (University of Rome – La Sapienza)
12.	IT	Arcangelo Rossi (Università del Salento)	Developments of English Science and Scientific Popularization between '700 and '800	
13.	IT	Arturo Gallozzi (University of Cassino and Southern Lazio, Italy)	... may God Protect You from Lightning ...	
14.	IT	Cesare Tocci (University of Rome La Sapienza)	Art and Science of Building in the Work of Giuseppe Damiani Almeyda	

[13] Alphabetical Name order.

15.	**CZ**	Daniel Spelda (University of West Bohemia in Pilsen)	Early Modern Histories of Astronomy: On Searching for Antediluvian Astronomy and vision of Astronomical Progress	
16.	**IT**	Danilo Capecchi (Università di Roma La Sapienza)	The Polytechnic Schools in Germany in the 19th Century (with Giuseppe Ruta)	
17.	**GR**	Dimitra Giannara (University of Tor Vergata)	Natural Sciences at the Service of Narratology: Exploring the Structure of Pirandello's Novels according to the Moebius ring	
18.	**IT**			Elena Cenacchi (Cenacchi Editrice Snc)
19.	**IT**	Emanuela Chiavoni (University of Rome La Sapienza)	The drawings concerning Artistic Techniques in the Diderot's Encyclopedia	
20.	**IT**	Emanuele Zamperini (University of Pavia)	Structural Analysis of Timber Trusses (1860–1940)	
21.	**IT**	Enrico Gasco (ZIRAK)	Semantic Spaces and History of Physics: a Case Study	
22.	**IT**	Enrico Giannetto (University of Bergamo, Italy)	Thomas Harriot, Modern Science and Inertia	
23.	**IT**	Enzo Bonacci (Liceo Scientifico "G.B. Grassi" of Latina)	The "Livio Gratton" Planetarium in Latina(Italy)	
24.	**GR**	Epaminondas Vampoulis (Aristotle University of Thessaloniki)	Galileo's use of Practical Knowledge	
25.				Fabrizio Bònoli (University of Bologna)
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A Turning Point in French officers Training: Mechanics in the Mathematics Course of Étienne Bézout (1730–1783)

Liliane Alfonsi
Enseignant–chercheur au Laboratoire GHDSO, Université Paris–Sud, Orsay, France
e–mail: liliane.alfonsi@u–psud.fr

Abstract. Étienne Bézout (1730–1783), member of the Paris Academy of Sciences, friend of D'Alembert, Laplace and Lagrange, was responsible for naval and artillery officers' schools from 1764 to 1783. He wrote for these schools a mathematics course which scored a great success even outside these schools and outside France. Before him, text–books for French officers' schools contained, not at all mechanics for Navy, and only statics for artillery (in a mathematics course by Charles Camus (1699–1768)). Bézout was the first to begin mechanics by a part of Differential and Integral Calculus and to use them, together with experimentation, for finding concrete results. The purposes of my talk will be three:

The first: to show some new experimental and theoretical methods used by Bézout to search ballistic formulae, metacenter and floating line for a ship, etc.

The second: to point out the controversy in officers' education, between defenders of mechanics theory and partisans of practice only.

The third: how, in this context, the Bézout's mathematic course was a turning point in French officers training and their mathematics level.

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The Cooling Law and the Definition of a Temperature Scale, from Newton to Dalton and Dulong–Petit

Ugo Besson
Department of Physics, University of Pavia, Italy
e–mail: ugo.besson@unipv.it

Abstract. The research on the cooling law of objects in a colder environment has begun with a Newton's article published in 1701, who established the exponential law of cooling: "supposing that the excess of the degrees of heat of the iron above the heat of the atmosphere were in geometrical progression when the times are in arithmetical progression". Later, during 18th century and the early 19th century, studies were performed by other scientists, confirming or confuting Newton's law (Martine, Erxleben, Richmann, Biot, Prévost, Leslie, Dalton, Rumford, Dulong and Petit), and assuming different attitudes faced to the discrepancies between law and experiments.

In this communication I will discuss how some scientists interpreted this law, its epistemological status and its relationship with the problem of defining a good scale of temperatures. I will focus on the works of Newton, Dalton and Dulong and Petit. Newton was mainly interested in defining a thermometric scale for high temperatures and considered the exponential law of cooling as a general hypothesis allowing to build a temperature scale more than an empirically testable relationship. Dalton (1808) considered the exponential Newton's law "one remarkable trait of temperature derived from experiments on the heating and cooling of bodies, which does not accord with the received [Fahrenheit] scale, and which, nevertheless, claims special consideration", and constructed a new temperature scale, in order to obtain an agreement between this law and the experimental data. Dulong and Petit (1817) criticized Dalton because "he unduly hastened to generalize some outlines […] which were based only on dubious evaluations", performed a very accurate experimental study, considering a temperature scale based on the air thermometer, and distinguished cooling processes due to radiation and to convection, by measuring the cooling velocity of a body in a vacuum.

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The "Livio Gratton" Planetarium in Latina (Italy)

Enzo Bonacci
Liceo Scientifico Statale "G.B. Grassi" of Latina, Italy
e–mail: enzo.bonacci@liceograssilatina.org

Abstract. The "Livio Gratton" is a small size planetarium (40–seat capacity) located in Latina; it belongs to the Scientific High School "G. B. Grassi" since its construction in 2003.

In less than eighteen months of activity the number of admissions has been superior to 4000, but the situation was rather different previously, when the almost absolute lack of information about the structure and the few visitors induced the Headmaster to accomplish a managing, cultural, educational and scientific valorization policy.

Such galvanizing experience is worthy to be described from the discouraging premises till the positive response from audience and critics.

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Digitization and Online Publishing of the whole Historical Archive of the Department of Astronomy of the University of Bologna

Fabrizio Bònoli
Dipartimento di Fisica e Astronomia, Università di Bologna, Italy
e–mail: fabrizio.bonoli@unibo.it
Elena Cenacchi
Cenacchi Editrice, Castelguelfo Bologna, Italy
e–mail: elena.cenacchi@gmail.com
Agnese Mandrino
I.N.A.F. Osservatorio Astronomico di Brera, Italy
e–mail: agnese.mandrino@brera.inaf.it
Raffaella Stasi
Dipartimento di Fisica e Astronomia, Università di Bologna, Italy
e–mail: raffaella.stasi@unibo.it
Diego Zuccato
Dipartimento di Fisica e Astronomia, Università di Bologna, Italy
e–mail: diego.zuccato@unibo.it

Abstract. The *Historical Archive of Astronomy*, University of Bologna contains records on scientific and administrative life of the institution, started in 1711 as the astronomical section of the *Istituto delle Scienze* founded by Count Marsili. The oldest records: 1679 on the planning of the tower. The 61 envelopes represent the archive's most extensive series devised by d'Arturo. A precious collection of letters between the astronomers in Bologna and foreign scientists was provided, e.g.: Cassini, Salvago, Marsili, Scheuchzer, Laval, Mossotti, d'Arturo. The most recent documents: 1958. We present the first results of a project (supported by *Sistema Museale d'Ateneo*, University of Bologna) concerning digitization of the whole *Historical Archive*: more than 70.000 *folia*. The original documents, already inventoried by "Specola 2000" project (*Italian Astronomical Archives*) are scanned both at low and high resolution (www.archivi.beniculturali.it/servizioII and http://sait.interlandia.net/node/44). The original inventory indexes, previously listed in text and html files, is stored as metadata in a MySql database and output as XML files following the *Encoded Archival Description* schema. The implementation of an international encoding standard makes easier the use of software for parsing, indexing and delivering of data and images. This solution allows simple xhtml files, *Content Management System*, and OAI gateways (European DB). The watermarked low–resolution images are online for friendly consulting and preserving the original sources.

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From Scientia To Scientia: Salvo D'Agostino's History of Physics and the Tradition of Theoretical Physics

Stefano Bordoni
Department of Foundations of Science, University of Urbino, Italy
e–mail: Stefano.bordoni@gmail.com

Abstract. In 1967 and 1968, the Italian physicist Salvo D'Agostino published two papers in the scientific journal *Scientia*. The first dealt with the electromagnetic theories put forward in the first half of the nineteenth century, and the second dealt with Maxwell's early concept of electromagnetic field. That conceptual and historical approach can be traced back to Mach, Poincaré and Duhem's critical reconstructions of physics, and to other historical and conceptual analyses subsequently hosted by the journal *Scientia* itself in the first years of the twentieth century. *Scientia* had been founded in 1907 as a journal devoted to a cultural debate on contents, methods and foundations of science: authoritative mathematicians and physicists had discussed the theoretical and meta–theoretical issues which emerged from the contemporary scientific practice. D'Agostino's papers represented one of the first instances of professional history of physics in Italy, and at the same time, the re–emergence of a specific feature of theoretical physics around the turn of the twentieth century. From the point of view of long–term processes taking place in the history of science, D'Agostino's researches on the history of physics can be looked upon as a new implementation of a theoretical and meta–theoretical attitude, which was the hallmark of *Scientia* and late nineteenth–century theoretical physics.

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The Ontological Levels of Scientific Theories and Technical, Ethical and Educational Progress

Giuseppe Boscarino
Sortino, Italy
e–mail: gpp.bos@libero.it

Abstract. What I propose to discuss in my paper is the following: Does science deal only with *facts*?, Does ethics deal only with *values*? May there be scientific–technological and ethical – educational progress ? The *science ontological categories* and the *technical–ethical category* which must be the background of the progressive working of the science and of its teaching. We analyze the positivistic and post–positivistic solutions of the questions. It is shown as, in the science progressive working, *what is*, *what has to be*, *what can be*, and *what ought to be* are interconnected The choice of the *rationalistic and humanistic tradition about the way to make science* and *to teach it* can establish a modern progressive education.

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Surveying Methods and Instruments in the Treatises of Ieronimo Pico Fonticulano (1541–1596)

Stefano Brusaporci
Architecture and Town Planning Department, University of L'Aquila, Italy
e–mail: stefano.brusaporci@univaq.it
Mario Centofanti
Architecture and Town Planning Department, University of L'Aquila, Italy
e–mail: mario.centofanti@univaq.it

Abstract. Ieronimo Pico Fonticulano (Fontecchio (L'Aquila) 1541 – Naples 1596) had a multifaceted personality: mathematician, land–surveyor, cartographer, architect, writer of treatises. He is the author of two printed volumes that can be included between the most interesting treatises of the XVI century: *Geometria* [Geometry], published posthumous in 1597, and *Breve descrittione di sette città illustri d'Italia* [Short description of seven Italian eminent cities] published in 1582. In L'Aquila Provincial Library there is a manuscript (location ms. 57), no titled, composed by two different parts which contents greatly correspond to the ones of *Geometria* and *Breve descrittione*Moreover in the manuscript there are the two city maps of Naples and of L'Aquila.

As part of Fonticulano training, it's important his relationship with Francesco De Marchi (Bologna 1504 – L'Aquila 1576), architect, expert in military engineering, treatises writer, fundamental personality in the European XVI Century, who arrived in L'Aquila in 1572 in the entourage of Margaret of Austria.

In the XVI century surveying becomes very important because of the development and deep modification of military techniques, above all according to the use of firearms and then to the need, on one hand, to design new complex rampart systems, on the other hand, to direct the firing of artillery.

In particular in the sixty book of Geometria, Fonticulano treats and enumerates the surveying instruments, with richness of drawings, and their methodological and operative use: the geometric quadrant; the quadrant of the circle; the asymmetric square; the simple latin radius with compass; the latin radius with quadrant and altimetry scale; the Jacob's staff; the lame, or mobile square; the lame square with compass; the reduction drawing–compass; the compass; the clinometers, called altimetry scale or vertical circle; the artilleryman level; the theodolite; the plumb–rule; the water level; the wind level.

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The Polytechnic Schools in Germany in the 19th Century

Danilo Capecchi
Dipartimento di Ingegneria Strutturale e Geotecnica, University of Rome La Sapienza, Italy
e–mail: danilo.capecchi@uniroma1.it
Giuseppe Ruta
Dipartimento di Ingegneria Strutturale e Geotecnica, University of Rome La Sapienza, Italy
e–mail: giuseppe.ruta@uniroma1.it

Abstract. In the first years of the 19th century two very different university models appeared in Europe. The first took origin in France after the great revolution, and became spread also elsewhere after Napoleon. The second appeared in the Prussian state; thus, this model was the key to the following future German university institutions. Both models made a sensible impact on other European well–established models, such as the Italian and the British. Wilhelm von Humboldt conceived the Prussian university model, which is thus called and known after him. Von Humboldt was influenced by the pedagogy of Johann Heinrich Pestalozzi, and based his model on Friedrich Schleiermacher's liberal ideas. His goal was to demonstrate the process of the discovery of knowledge and to teach students to "take account of fundamental laws of science in all their thinking." In this contribution we leave aside a general study on these universities and we will focus on the organization of German polytechnic schools. Indeed, it is well known that the French polytechnic schools took origin from the need of the revolutionary state to prepare military engineers to defend from European monarchies. On the contrary, higher technical schools in Germany and Germany–influenced countries were originally not well framed within the educational system, since in principle they should provide technical education and could not release doctorates, which remained a privilege of universities; things however changed in the second half of the 19th century and polytechnics also were modelled on the basis of Von Humboldt ideas. Due to the fragmentation of German–speaking states, there were technical high schools in each of them. Their aim was twofold: on one hand, they should prepare state personnel; on the other hand, they should provide the basic industrial training for the emerging industrial society. A model in this field was the Karlsruher Polytechnikum, which was organized university–like, resembling the French high schools, but with some differences: the base and the application periods were separated in France, unified in German–speaking countries; the French schools had a very high scientific level, while German polytechnics were seen primarily as educational institutions and research was not important. We will concentrate our attention on some of them, which have become famous also because of the eminent personalities among their faculty staff, like those of Berlin (founded 1821), Karlsruhe (founded 1825), München (founded 1827), Hannover (founded 1831).

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From Adam Heroldt to Lusuerg Builders of Scientific Instruments in Roma 17th–19th

Fausto Casi
Museo dei mezzi di comunicazione, Arezzo, Italy
e–mail: faustocasi@tiscali.it

Abstract. A large project of mine regarding with the production of running manufacturing of scientific instruments in Roma (17th–mid–19th) had an important advancement thanks to recent results published in *Scienziati aretini dal '400 al '700: testi e strumenti* (1993). Some compasses were compared, particularly, one signed by Adam Heroldt (first half of 17th century) and the others signed by Jacobus Lusuerg and Dominicus Lusuerg (from the mid–17th century onwards). Interesting similarities concerning the scales of measurement and calculation clearly appeared I recently discovered a new Adam Heroldt's instrument from Lusuerg family in Roma. In my talk I will speech on cited instruments and the scientific connection between the two cited families.

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An Outline of History of Mechanism Design in Servicing Science

Marco Ceccarelli
LARM (Laboratory of Robotics and Mechatronics), University of Cassino and South Latium, Italy
e–mail: ceccarelli@unicas.it

Abstract. In general history of Mechanism Design (MD) is presented as a sequence of achievements in Technology likewise History of Science (HS) is presented as historical evolution of knowledge with theoretical achievements that have been later used in Technology.

Thus, in general it is believed that Mechanism Design has been developed for practical proposes as an application of machine experiences and science achievements. But it I s also true that Mechanism Design has been instrumental for Science developments both as necessary means and dreamed/desired goals.

In this paper the problem of outlining the links between MD and HS is approached to address the abovementioned aspects. General consideration are discussed to show how the HS and HMD can be indeed understood as linked to each other because of strong relationship between practice and theory in knowledge evolution for system developments.

In particular, few examples are illustrated to show those characteristics that have established such an interaction in the Renaissance and are still persistent in the current activity. But while in Renaissance Science went towards MD to develop it as a rational discipline, in current time MD is directed to Science with those characters of theory, speculation, and generalization for a wide service to Technology and ultimately to the Society.

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The *Qiqi tushuo* by the Jesuit Johann Schreck: Europeans *Theatra Machinarum* in China in the XVIth Century

Michela Cigola
Dipartimento di Ingegneria Civile e Meccanica, University of Cassino, Italy
e–mail: cigola@unicas.it

Abstract. This article aims to investigate the role played by various missionaries of the Society of Jesus in the development and spread of European scientific and mechanical knowledge in China in the XVIth century and specially by Johann Schreck (1576 Bingen, Baden–Wurttenberg–1630 Beijing; China; Chinese name Deng Yuhan), a jesuit with a wide range of interests and vast scientific and literary culture, he studied in Germany, France and Italy, where he became a disciple of Galileo.

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The Improvement of Haret's Social Mechanics

Vincenzo Cioci
Research Group on Physics Education and History of Physics, University of Calabria, Italy
e–mail: vincenzocioci@google.com
Antonino Drago
University of Pisa, Italy
e–mail: drago@unina.it

Abstract. A first part of the communication describes the series of social "laws" Haret suggested in a parallel way to mechanical laws, in the aim to obtain a systematic treatment of social life as a textbook on mechanics does.

A first addition to this old text is Pareto's work formalizing the individual's behaviour inside a market; the resulting ophelimity curve represents the best attempt to measure in a quantitative way one of the three basic variables describing – according to Haret – a social phenomenon, i.e. the economic variable. The second addition is the social meaning attributed by Leibniz to the impact of elastic bodies, by him formalised as first. This subject deals with the social conflict, i.e. a subject almost disregarded by Haret, whose attitude was to consider – just the Newtonian attitude – a society as a rigid body. A third addition is to consider the parallelisms suggested by the great strategist Lazare Carnot between the strongholds defence and mechanical machines; in particular, the parallelism concerning the notions of reversibility and the second–order efficiency. In fact, these suggestions depend from the principle of virtual velocities, which was little considered by Haret. Instead it and also its higher principle, the principle of the impossibility of a motion without an end, add new social "laws", which in general may be considered as the invariants of the system evolution.

More in general, the theory of mechanics presents more formulations beyond Newton's theory, so that the common physical notions suffer radical variations in their meanings when are considered in two different formulations. Our additions are inspired by the Carnotian theory of mechanics which is alternative to the previous one. Hence the question of a rational construction of a theory of social mechanics according to this alternative formulation is met. One has to formulate the mechanical theory of social phenomena by first of all recognizing a basic problem (e.g. how survive), which is solved by inventing a new scientific method and which is discovered by arguing through double negated sentences composing ad absurdum arguments.

Finally, an attempt to suggest the social "laws" in analogy to kinetic theory of gas is offered

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Engineering History in Italy

Salvatore D'Agostino
University of Naples Federico II, Italy
e–mail: sdagost@unina.it

Abstract. The great world of Engineering, since the first Industrial Revolution, has outburst in its all different aspects, from university education to technological and industrial development, both civil and mechanical engineering, as well as electrical and chemical, aerospace and computer science. Due to major concentration on research and innovation, projection toward an inexhaustible technological development affecting relevant and everlasting changing of everyday life, "history" has been neglected These continuous changings lead to an overgrowing disorientation and suspicion among people since technical and scientific culture is unprepared to face political and social demand of an historical period in which regressive tendencies against scientific progress arise. Thus engineering, which rules technological development and scientific effects on society, must reach more critical consciousness as result of historical knowledge. On these basis Italian engineering, in the last ten years, has promoted relevant efforts in order to develop a deeper knowledge of its own history. The Conference of Deans of Engineering Faculties produced a collection of monographic books and in 2004 the Italian Association of History of Engineering has been found, which has promoted biennial meetings. The aim of these meetings is to illustrate the foregoing process and results obtained and to show the paramount role the History of Engineering should play in the formation of future engineers. To this purpose as a strong exemplification, the historic evolution of the relationship earthquakes – population will be presented as well as the responsibility of engineering in designing a possible preventive project, involving all the scientific capabilities of all society finally acquainted with an ineluctable historical process.

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Maxwell's Dynamical Approach to Electromagnetism and Kinetic Theory

Salvo D'Agostino
Department of Physics, University of Roma La Sapienza, Italy
e–mail: saldagostino1921@tiscali.it

Abstract. The outstanding contributions of J. C. Maxwell (1831–1879) to theories of the electromagnetic fields and a kinetic theory of gas have been extensively studied in recent years. But it is scarcely known that all along his short scientific carrier he also contributed to an important philosophy of science. My present study deals in fact with Maxwell's ideas of a *dynamical approach* to his field theory of electricity and magnetism and to his statistical gas theory. He meant by a *dynamical approach* a view of a theory of the motions in the electromagnetic field and in the gaseous state which could dispense with the detailed mechanism of the moving particle. In order to develop this type of approach, he applied a modified form of Lagrange's equations in his great opus *A Treatise on Electricity and Magnetism*. But an attentive historical research also realizes that he used an *analogous approach* in his celebrated contributions to the kinetic theory of gases. In fact, in his papers on the kinetic theory of gases, he used the well known statistical approach to their motions, and his celebrated law of velocities, as an expression of his *dynamical philosophy*. He intended his theory as an opposition to a detailed theory of motion of the atomic particles in the gaseous state. It cannot be denied however, that his famous Demon metaphor also pretended to exclude the detailed motion description. It can be reasonably argued that, by following his *dynamical philosophy*, Maxwell intended to bridge the gap between particles and fields and to criticize what could be viewed as a splitted research program. His ideas on these matters did not favor his agreement with Boltzmann's mechanical method of dealing with a kinetic theory.

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The Planimeters

Alessandra D'Amico Finardi
University of Bergamo, Italy
e–mail: alessandra.damico–finardi@unibg.it

Abstract. Planimeters are area measuring tools: actually they are precision instruments used to trace around a closed loop of an object to find its area. Planimeters are used by engineers, surveyors, contractors, designers, medical professionals, and more. There are many kinds of planimeters, but principally roller and polar planimeters were introduced and used Roller planimeters are attached to wheels that allow unlimited horizontal travel and vertical travel within the limits of the arm movement. Polar planimeters are attached to a weighed base by an arm that allows movement with a circular area. Roller units offer more versatility since they are not "pinned" down to the work area. The tracer arm should be moved in a clockwise direction and returned to the original starting point. The area could then be read directly on the dials. Moving the arm counterclockwise will give a negative reading. This can be used to subtract smaller areas contained in larger ones. Better planimeters have adjustments to allow the device to read in various units and scales. Other units simply read in a fixed scale such as square centimeters and require the results to be scaled to the units required The Swiss mathematician Jakob Amsler–Laffon built the first modern planimeter in 1854, the concept having been pioneered by Johann Martin Hermann in 1814. This paper first delineates the mathematical principles on which the planimeter works, and then summarizes the principal types of planimeters.

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What can we Learn from Riddles and Paradoxes? an Integrated HPS Approach to Kant's Cosmology

Silvia De Bianchi
Department of Philosophy, University of Rome La Sapienza, Italy
e–mail: silvia.debianchi@uniroma1.it

Abstract. The aim of this paper is to shed light on the origin of the most relevant philosophical questions that Kant raised in the 18th century. One of his most relevant statements, "Two things awe me most, *the starry sky above me* and the *moral law within me*", can give us the chance to deal with a historically–informed philosophical investigation of Kant's system, and to display new approaches to the understanding of his philosophy of nature. By taking into account Kant's scientific background in the pre–Critical writings, it is possible to show the impact of traditional paradoxes and dilemmas that grounded his cosmology and cosmogony. In the first part of the paper, I shall draw the relevance of the Kepler and Halley's riddle, better known as the starry–dark–sky paradox, which has been later discussed and formalized by Olbers in the 19th century. In the second part of the paper, I shall clarify which elements of Kant's cosmology can be read as an answer to this riddle, involving a specific hierarchical structure of the universe. Conclusively, I shall show that, contrary to the received view, one of the first systematic answer to this paradox that was offered in terms of a hierarchical structure of the universe was not embodied by John Herschel's system, but rather by Kant's *Universal Natural History and Theory of Heavens* (1755) and by the *Antinomy of pure Reason*.

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Conflicting Issues for Mathematics at the Ecole Polytechnique during its First Forty Years of Existence: The Role of Lazare Carnot between Monge and Laplace

Jean G. Dhombres
Centre Alexandre Koyré, Paris, France
École des Hautes Etudes en Sciences Sociales, Paris, France
e–mail: jean.dhombres@damesme.cnrs.fr

Abstract. In 1829, when the Ecole centrale was created in Paris, in a way against the monopole of the Ecole polytechnique for the formation of engineers, it was said that the "analytical mind" of Laplace had unfortunately killed the « geometrical mind » of Monge. Indeed if this geometer was among others at the beginning of the Ecole polytechnique at the end of 1794, or year II, Laplace had been an important reformer of the Ecole when he became minister of Bonaparte after Brumaire in 1799. Laplace for instance, introduced "Algebraic analysis" in the curriculum, and the title if not the content, will be used by Cauchy for his famous "rigorous" course in 1821. Laplace also regulated the curriculum in view of what was to be taught in the écoles d'application. If both Monge and Laplace were dead at the time, the intellectual attacks in 1829 were in the direction of Cauchy, but too against ideas developped by Fourier and even by Auguste Comte. The two named mathematicians at the time were doing mathematical physics, whether elasticity, or heat propagation through Fourier integrals, and the philosopher, soon to be a lecturer at École polytechnique, was then promoting the idea of a proper culture for engineers in his *Cours de philosophie positive*, the first volume of which was published in 1830. The discussion really was one on the rôle of mathematics for applications. If in this context which I will recall, using archives newly explored, I discuss the ideas of Lazare Carnot, too often forgotten in the discussion in the opposition between applied and pure mathematics, it is also because it appeals to contemporary questions for the teaching to engineers. Up to questions on the use of history for the curricula for engineers, which I have precisely developped at the Ecole centrale.

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Dualism Wave – Particle and Principle of Relativity

Pietro Di Mauro
I.N.F.N. Sezione di Catania, Italy
e–mail: pdimauro@lascuolaitalica.it

Abstract. Is it compatible the de Broglie's relation with principle of relativity? A few reflections and ideas to put together the principle of relativity, foundation of classic and relativistic physics, and the wave – particle dualism, basis of quantum mechanics.

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The Emerging of two Options from Einstein's First Paper on Quanta

Antonino Drago
University of Pisa, Italy
e–mail: drago@unina.it

Abstract. Einstein's paper of 1905 on quanta is examined under two aspects, i.e. its organisation of the theory and the mathematics which it appeals to. By considering various physical theories, paper's "Introduction" stresses a theoretical conflict between the use of "continuous spatial functions" (e.g. by electromagnetism) and the use of the "finite" mathematics (e.g. by gas theory), or evenly the "subdivision in arbitrarily small parts" and the discrete. Hence, he claimed that in theoretical physics there exists an *option on the kind of mathematics*: 60 years later it was formalised as the option between the classical mathematics and the constructive mathematics.

Einstein's exposition does not represent a deductive theory, being "heuristic" in nature. It starts from a problem; in Einstein's paper a problem is located in the middle of the Introduction: may the continuous mathematics of the electromagnetic theory lead to contradictions? Then he argues through double negated sentences belonging to non–classical logic and an *ad absurdum* argument. Hence, according to Einstein, there exists also *an option on the kind of organization*; moreover, he deliberately organised his theory according to the alternative model of a theory, called by him "principle theory".

In conclusion, Einstein founded on both the alternative choices to the Newtonian ones his quanta theory. Previously, three theoretical physicists (L. Carnot, S. Carnot, the same Einstein) have founded their theories (respectively mechanics, thermodynamics and special relativity) on the two alternative choices, but all in an unsatisfactory way; as first Einstein consistently founded a theory on the two alternative choices.

As a consequence, his paper suggested to enlarge their explicative tools by including the alternative choices to the Newtonian ones. In fact, it was indispensable to take in account the two alternative choices to the Newton's two basic choices; or, more in general, the two options. Previously, they have been obscured as specific features of either lateral formulations (e.g. the problematic organisation in the Lagrangian mechanics) or immature theories (e.g. the constructive mathematics in thermodynamics). Unfortunately, also later they have been obscured by considering them as dispensable philosophical issues, because they lacked of certain mathematical formalisations.

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Black Body Theory: the Insufficiency of Planck's Calculations

Antonino Drago
University of Pisa
e–mail: drago@unina.it

Abstract. In order to solve the problem of black body theory, Planck performed a series of calculations, whose results shocked the theoretical physicists of that time. These calculations are easily severed in six groups. The analysis of these calculations shows that each group is disconnected from another group, both in mathematical terms and in conceptual terms, except for the fifth group, which systematizes the previous two groups. At present all the groups of calculations which suggested the novelty, i.e. the quanta of light are to be considered as fortunate calculations or retrospective calculations from Wien's law. Moreover, there exist theoretical reasons for rejecting these calculations, as being essentially insufficient to lead to the notion of quanta. No one of them is valid for teaching in a correct way the black body theory, apart those of the fourth period (probability), provided that the students are advised that their hypotheses represent an approximation to the correct ones.

The unsuccessful of these calculations is explained by a philosophical reason: they relied on two theories, the electromagnetism and the thermodynamics, which are mutually incommensurable; in the former theory the mathematics is the classical one, whereas in the latter theory the mathematics is bounded to the elementary functions (and in statistical thermodynamics to the "discrete" mathematics). In philosophical terms, the respective notion of infinity, i.e. the actual infinity in the former theory, the potential infinity in the latter one were at variance; owing to the lack of a common mathematical language, no deductive calculation linking these two kinds of infinity could be successful.

Planck obscurely apperceived this difficulty. In fact, his last group of calculations compared, through an equation, two different notions of temperature; the former being of thermodynamic nature and the other one being of electromagnetic–quantistic nature; i.e. his comparison wanted to formalise the radical variation in the mathematical meanings of a notion shared by two incommensurable theories.

In a retrospective view, the Planck's rallying to Boltzmann's statistical mechanics helped him to conceive the chaos in electromagnetism, and hence to take advantage of the discrete mathematics of statistical mechanics; but it led him also to pursue a deductive theory derived from a priori hypotheses, as statistical mechanics is; but being impossible a deductive calculation proving quanta from two incommensurable theories, he was obliged to present them as no more than a hypothesis, in the hope for new calculations regaining classical physics.

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The Thermodynamics and the Principle of Virtual Velocities

Antonino Drago
University of Pisa, Italy
e–mail: drago@unina.it
Raffaele Pisano
"Cirphles", École Normale Supérieure Paris, France
"RCTHS", University of West Bohemia in Pilsen, Czech Republic
e–mail: pisanoraffaele@iol.it

Abstract. The principle of virtual velocities governs some formulations of mechanics which are alternative to Newtonian mechanics. Lazare Carnot explicitly claimed to have founded on this principle his formulation, which for the first time obtained in a theoretical way several characteristic features of mechanical machines. When founding thermodynamics, his son Sadi Carnot declared to conform his theory to the "already completed" theory of mechanical machines. In fact, the analysis of S. Carnot's theoretical premises reveals several characteristic features of the principle of virtual velocities; moreover, through this principle, a formal link between L. Carnot's mechanics and modern thermodynamics, in particular its two basic principles, is suggested

Some theoretical considerations are added by comparing the above link with other links, suggested in the past, between thermodynamics and a mechanics' formulation.

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Reassessing W. J. ‘s Gravesande’s Appropriation of Newton’s Methodology

Steffen Ducheyne
Centre for Logic and Philosophy of Science, Free University of Brussels, Belgium
e–mail: steffen.ducheyne@vub.ac.be

Abstract. The Dutchman Willem Jacob ‘s Gravesande (1688–1742) was, as the literature has it, one of the most influential advocates of Newtonianism on the Continent. In view of the position he took in the dispute over *vis viva*, ‘s Gravesande’s occasionally critical attitude towards Newton’s doctrines has been correctly brought to the fore. Yet, despite such mitigation of his Newtonianism, it has been maintained that he was an advocate of Newton’s methodology. In the third edition of his *magnum opus*, ‘s Gravesande himself had signalled that being a Newtonian philosopher is not contingent upon whether one accepts Newton’s doctrines *ad literam*; rather, a Newtonian philosopher is he who follows Newton’s method. Correspondingly, Gravesande’s ‘Newtonianism’ was essentially methodological, it is claimed: although he may have been selective in his endorsement of Newton’s doctrines, his adherence to Newton’s method was unremitting. In this presentation, I seek to qualify and even challenge this assessment. Based on a thorough survey of ‘s Gravesande’s *oeuvre*, I shall spell out the details concerning his appropriation of Newton’s natural philosophy and methodology in particular. I shall argue that: *i.* by restricting the scope of physics to the study of universal effects ‘s Gravesande radicalized some of Newton’s methodological precepts, *ii.* ‘s Gravesande attempted to provide a secure basis for the certainty of Newton’s natural philosophy by assimilating it into an epistemological framework that was alien to Newton, *iii.* ‘s Gravesande’s omission of Newton’s fourth *regula philosophandi* reflects profound epistemological and methodological differences between him and Newton, *iv.* ‘s Gravesande did not call attention to significant features of Newton’s methodology, *v.* ‘s Gravesande never developed a detailed picture of how mathematics and experimentation are to be integrated exactly, and *vi.* ‘s Gravesande’s views on ‘theory confirmation’ were at odds with Newton’s views on the matter. To sum up, I will document how ‘s Gravesande integrated Newtonian and non–Newtonian elements into an eclectic account of *physica*.

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The Helium Atom and the Majorana Solutions of the Two–Electron Problem

Salvatore Esposito
I.N.F.N. Sezione di Napoli, Naples, Italy
e–mail: salvatore.esposito@na.infn.it
Adele Naddeo
Dipartimento di Fisica "E.R. Caianiello", Università di Salerno, Salerno, Italy
e–mail: naddeo@sa.infn.it

Abstract. It is commonly believed that the early wide acceptance of quantum mechanics was triggered by the successful description of the simplest atomic system, i.e. the hydrogen atom, according to already known spectroscopic data. However, historians of physics know quite well that the definitive abandonment of the old quantum theory by N. Bohr and A. Sommerfeld came through the thorough consideration of the helium atom problem, with particular reference to the specific prediction of the ground state energy of neutral helium. The failure of the old quantum theory to describe successfully two–electron atoms, in fact, triggered (at least in part) the development of quantum mechanics in 1920s and, once the basic formalism had been established by W. Heisenberg and E. Schrödinger, early variational calculations (the problem couldn't be solved analytically, as instead for the hydrogen atom) produced remarkably good results for the ground state of the helium atom, thus breaking the ground for the general acceptance of quantum mechanics.

Here we review the known early results about this topic, and then discuss unknown results obtained almost simultaneously by Ettore Majorana. As we will see, a large part of Majorana's results were deduced by making recourse to novel methods not yet appeared in the literature (both of that time and in present day studies), and while part of those numerical results were (and are) inaccurate when compared with the experimental data, the novel methods reveal themselves to be quite useful in the frontier research related to atomic and nuclear physics.

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Spreading Scientific Philosophies with Instruments: the Case of Atwood's Machine

Salvatore Esposito
I.N.F.N. Sezione di Napoli, Naples, Italy
e–mail: salvatore.esposito@na.infn.it
Edvige Schettino
Dipartimento di Scienze Fisiche, Università di Napoli "Federico II", Naples, Italy
e–mail: edvige.schettino@unina.it

Abstract. We present a study of how the paradigm of Newton's science, based on the organization of scientific knowledge as a series of mathematical laws, was definitively accepted in science courses – in the last decades of the XVIII century, in England as well as in the Continent – by means of the "universal" dynamical machine invented by George Atwood in late 1770s just for this purpose.

The spreading of such machine, occurred well before the appearance of Atwood's treatise where he described the novel machine and the experiments to be performed with it, is a quite interesting historical case, which we consider in some detail. In particular, we focus on the "improvement" introduced by the Italian Giuseppe Saverio Poli and the subsequent "simplifications" of the machine, underlying the ongoing change of perspective after the definitive success of Newtonianism.

The case studied here allows to recognize the relevant role played by a properly devised instrument in the acceptance of a new paradigm by non–erudite scholars, in addition to the traditional ways involving erudite scientists, and thus the complementary role of machine philosophy with respect to mathematical, philosophical or even physical reasoning.

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From Science to Philosophy: A. N. Whitehead and the Notion of "Process"

Francesco Maria Ferrari
Pontifical Lateran University of Rome, Italy
e–mail: ferrarifram@gmail.com

Abstract. In this paper we argue logical reasons in justification of A. N. Whitehead's fundamental intuition, about ontological foundation of modern natural science (modern Physics). This option is a consequence of *meta*–logical results: of Gödels' *incompleteness theorems*, as well as of Skolem's and Dedekind's theorems.

Afterwards, we argue direct connection between Whitehead's ontological approach (based on "process") and new physical sciences (quantum mechanics and relativity). Analyzing "process" in W.'s conception , we will show that this suggestion, can have a revealing theoretical role above all under the new light of the latest paradigm of complexity, due to the discover of complex physical systems, which got as its own consequence the conclusive collapse of reductionism, represented in physics by mechanistic atomism.

At last, we show logically in what a self–organizing process consists of and, after all, how and why complexity and self–organization lead to a deep reconsideration on meaning and nature of the physical necessity of causal law. Indeed, since the dynamic behavior of complex systems is essentially non–predictable, regardless of defining unity, power and precision for initial conditions' measures (energetic–dynamic), and since it is sensitive to minimal fluctuation of state, causality needs a non–logical foundation, because the logical is based on formal systems in which all the information is given once forever, postulating axioms.

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Explorating the Beginning of the Astronomical Scientific Activity of the Astronomical Observatory of the University of Coimbra (1772–1813)

Fernando B. Figueiredo
IGUC, Geophysical Center of the University of Coimbra), University of Coimbra, Portugal
CFV, Centre François Viète, épistémologie, histoire des sciences et des techniques,
University of Nantes, France
e–mail: bandeira@mat.uc.pt

Abstract. The establishment of scientific education at the University of Coimbra was one of the most important features of the Reform of the University in 1772. One of the best examples is the creation of the Faculty Mathematics and of the Astronomical Observatory (OAUC).

The foundation of the OAUC was fundamental in the institutionalization of astronomical science in Portugal, during a period when astronomy, supported by the great theoretical advances of the celestial mechanics and applied mathematics, could finally provide some important solutions to the most prominent scientific problems since Newton (questions about celestial mechanics, navigation, geodesy, etc…). Such questions were also central in the conception and planning of OAUC – the first Portuguese university–based astronomical observatory, although with aspects of a National Observatory. The construction of the OAUC was originally planned for the site of the Castle of the city of Coimbra (1775) and finally a small provisional Observatory was built inside the courtyard of the University. The definitive OAUC was built between the years 1790–99.

Jose Monteiro da Rocha (1734–1819) was the central personality in the conception, planning and construction of OAUC, as well as in its instrument's provision and posterior scientific activity. His teaching activity, first ate chair of Physics–Mathematics (1772) and later at Astronomy (1783), as well as the first Director of the OAUC (1795), would shape pedagogic and scientifically the Faculty's life and practice (and also the University itself), as well as all of the activity of the Observatory. He was the individual behind the applied mathematical and astronomical methods that allowed the OAUC to establish and publish its most important and significant scientific production: the 'Ephemerides Astronomicas do Real Observatório da Universidade de Coimbra' (1803) (the Astronomical Ephemeris of Coimbra Observatory).

In my talk José Monteiro da Rocha's contributions concerning foundation of the scientific astronomy activity in the new Faculty of Mathematics and the Royal Astronomical Observatory of the University of Coimbra are presented; some of his most outstanding teaching activity and astronomical research are listed, as well.

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Ludwik Silberstein

Piotr Flin
Jan Kochanowski University, Kielce, Poland
e–mail: sfflin@cyf–kr.edu.pl
Hilmar Duerbeck
Vrije Universiteit, Brussel, Belge
Włodzimierz Godłowski
Opole University, Opole, Poland
e–mail: godlowski@uni.opole.pl

Abstract. We present the main achievements of Ludwik Silberstein (1872 Warsaw–1948 Rochester), who spent years 1899–1904 as a lecturer of mathematical physics in Bologna and 1904–1920 in Rome. We concentrate on the subjects in which his influence was important for further development of science.

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Court Engineering in Ptolemaic Alexandria

Helen Fragaki
UMR Archéologies et Sciences de l'Antiquité, Maison René Ginouvès – Nanterre, France
email: hlnef@yahoo.com

Abstract. The works of Hero of Alexandria involve an extensive use of geometry and combine theory and practice, even though the empirical process must have played an important part in obtaining results. The date of birth of this scholar remains unknown, but he is generally thought to have been active around the middle of the 1st c. A.D. Despite their originality, his writings are greatly inspired by earlier works dating back to the 3rd c. B.C., especially those of Ktesibios and Philo of Byzantion, to whom direct reference is made. Hero's major debt towards his predecessors implies that his methodology originated from the Alexandrian engineering tradition of the Ptolemaic period. Therefore the use of abstract principles for technical purposes must have been already practiced in the Museum and the Library, two major institutions for scientific research founded by the Ptolemies in the 3rd c. B.C. Studies in engineering were then strictly connected to the court, conducted inside the royal quarters and set under the patronage of the king. The inventions of Ktesibios and Philo included war machines designed for siege and military defense, as well as hydraulic devices for agriculture and water supply. As these technical achievements provided the monarchy with the necessary means for an efficient and unshakeable rule, they became part of the royal prestige. Even automata and magic vessels created by the king's engineers were used for propaganda, demonstrating the supernatural powers of the sovereigns, who where gradually assimilated to gods during this period. In this historical context applied science seems to have been perceived as an extension and a proof of the divine power of the rulers, enhancing their image and consolidating their strength. This eminent role explains why the transgression of the tension between theoretical research and mechanics was attained in the realm of court engineering.

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"Palatini's Method" offers a NEW VIEW to Non–Euclidean Geometry

Mauro Francaviglia
Department of Mathematics, University of Torino, Italy
e–mail: mauro.francaviglia@unito.it

Abstract. Until XVII Century Euclidean Geometry was the only language for the Universe**.** Galilei claimed in 1623 that "the Universe is written in mathematical language and its characters are circles and straight lines"; Newton's Universal Theory of Gravitation used Euclidean Universe. A few years later "non–Euclidean Geometry" culminated with Gauss' theory of Surfaces and Riemann's views on curved manifolds. In 1854 Riemann wrote "the Universe is curved and curvature has to be obtained from astronomical observations". Riemann's views were developed by Einstein's General Relativity (1915): a four–dimensional manifold with metric (of Lorentzian signature). Levi–Civita developed the theory of Linear Connections in 1919. In 1972 it was fully understood that gravity in Spacetime is described by two fields: a conformal class of metrics (one chosen to fix measures) and a projective class of connections, mutually compatible (so–called "EPS axioms"). The variational method dealing with gravity with such fields was developed by Einstein in 1923 (improperly called "Palatini Method").

Palatini Method and non–Linear curvature Lagrangians offer a new perspective on non–Euclidean Geometries, especially for constant curvature. As is well known, the structure of ordinary Euclidean Space is based on two co–existing structures: the linear and affine structure (the "straight lines") and the metric structure (the "circles"). They are subtly related by a variational requirement: straight lines are geodesics (minimal distance curves) of the metric. They correspond to assigning a parallelism (a linear connection) and a metric; their compatibility is an example of EPS–compatibility.

Each non–linear Lagrangian f(R) – R is the scalar curvature of such a couple – generates a universal variational principle that allows to obtain at once all spaces in which the connection is EPS–compatible with the metric and generates constant curvature. The function f(R) = $R^3/2 - R\log R$ generates in dimension 2 the three spaces of constant curvature 0, 1 and –1.

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Past and Present Classifications of Electroscopes and Electrometers: The Interplay between Structural and Conceptual Criteria

Lucio Fregonese
Physics Department and Museum, University of Pavia, Italy
e–mail: fregonese@unipv.it

Abstract. In my talk I will focus on the important problem of the interrelation between theory and structure in scientific instruments, with a specific focus on the wide class of measuring electrostatic devices developed during the 18th and 19th centuries.

The state of the art will be summarised presenting the positions of important authors who, at different times, have addressed the theory–structure relationship in the selected group of measuring devices and worked out corresponding classification criteria to handle the broad variety of models produced in the course of time.

I argue that the examined classifications are only partially satisfactory, either because they include a limited number of instruments, or because structural rather than conceptual classification criteria prevail. The choice of structure as a main taxonomic guide offers a simple solution which, nevertheless, overlooks the major problem of the often vague status of electrical theory, both about the quantity to be measured (electrical tension, electrical force, electrostatic potential), and the way in which the functioning of the instrument itself was or was not related to electrical theory. Clarification and different classification possibilities will be suggested by taking an evolutive perspective which intertwines the structural with the conceptual components and considers also the role of other major driving forces like the achievement of sensitivity, precision, comparability and absolute value of measurements.

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Symmetries in Newtonian Mechanics

Rossella Fucci
IIS "Montessori – Da Vinci" – Porretta Terme, Italy
e–mail: rofux@yahoo.it
Antonino Drago
University of Pisa, Italy
e–mail: drago@unina.it

Abstract. This work investigates on the role of symmetries as the basic mathematical technique of a scientific theory. They are considered in classical mechanics, which is usually equated to Newton's theory (1687). This theory is deductively drawn from its three laws and it is applied to the motion of heavenly bodies through infinitesimal analysis, which was considered as *the* mathematics for theoretical physics. Newton's theory in fact did not attributed a relevant role to symmetries, nor to conservation' laws. They have been introduced first of all by L. Carnot through a very simple technique; but unfortunately this fact was ignored Subsequently they have been introduced by some other theorists through a great deal of formalism. In a first part of this work we will present all the ways that they have been suggested by different authors.

By means of a comparison of all physical theories, Barut obtained that in theoretical physics symmetries play an alternative role to calculus. Moreover, one of us showed that a scientific theory is grounded on two options: one concerns the kind of mathematics (either the infinitesimal analysis or equivalently classical mathematics, o the constructive mathematics), the second one concerns the kind of organisation of the theory at issue (either a deductive organisation from few axioms, or an organisation aimed to solve a basic problem). A previous paper found out that the symmetries constitute the mathematical technique of the theories grounded on the two alternative choices to the Newtonian ones. In this sense, L. Carnot's mechanics is the exemplary theory, introducing symmetries by means a cycle of reasoning.

We investigate how this characterisation of symmetries from a foundational point of view help to improve the previously mentioned suggestions for introducing symmetry in Newtonian mechanics. For instance, it is possible, through Mahajan et al.'s suggestion, rearrange Newton's theory according to the alternative choices provided that the potential assumes the role played by an auxiliary variable in Lazare Carnot's mechanics.

Instead in Lagrange's mechanics, although the potential may be identified again to an auxiliary variable, it is not possible to recognise a cycle of reasoning leading to introduce symmetries, owing to Lagrange's embracing classical mathematics.

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"... May God Protect You from Lightning ..."

Arturo Gallozzi
Department of Civil Engineering and Mechanics, University of Cassino and Southern Lazio, Italy
e–mail: gallozzi@unicas.it

Abstract. As attested by the words attributed by popular tradition to Arnolfo di Cambio, who, after designing an imposing foundation system consisting of many deep wells beneath the church of Santa Maria del Fiore in Florence, said "*I have protected you from earthquakes, may God protect you from lightning*", the protection of monuments from lighting was a problem that took designers a long time to solve. It was only with the eighteenth–century discovery of the dispersive power of spikes that it became possible to construct efficient, structured systems to protect against harmful lightning bolts.

This study analyzes one of the first, and most important, installations of a lightning conductor system in Italy, applied to a significant and extended complex of monuments, such as the Abbey of Monte Cassino, in southern Lazio.

This study – in addition to a profile of the designer of the system, Feliciano Scarpellini, an astronomer and professor of physics, a leading scholar and scientific investigator in Italy during the late eighteenth and early nineteenth centuries, the founder, among other things, of the Accademia Caetani, which later became the Accademia dei Lincei – analyzes the relief and planar–altimetric arrangement of the lightning rods, which, together with other partially unpublished documents, provides several important measurements of the Abbey, which, completely destroyed by ferocious combat during the Second World War, left little graphic evidence that describes it geometrically.

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Physics Instruments for Polar Expeditions: the Case of the 1928 Italia–Airship Expedition

Leonardo Gariboldi
Dipartimento di Fisica, The University of Milan, Italy
e–mail: leonardo.gariboldi@unimi.it

Abstract. In 1928 the Italian polar expedition aboard the Italia–airship led by Umberto Nobile also involved scientific activities mostly in the physical and geophysical sciences. Three scientists, the Italian physicist Aldo Pontremoli, the Swedish meteorologist Finn Malmgren, and the Czech physicist Frantisek Behounek, joined the expedition. They planned and made measurements of several physical quantities: geographical location, atmospheric electricity and radioactivity, earth magnetism, sea depth, the behaviour of electromagnetic waves in the polar atmosphere, etc. The description of the measurements and of the main instruments used in those researches is given in the context of the main developments of the physical sciences of the time. Some of the instruments, such as the devices to measure gravity acceleration, for magnetic and oceanographic research, had been built for the occasion by Pontremoli himself.

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Semantic Spaces and History of Physics: a Case Study

Enrico Gasco
ZIRAK – Software department, Mondovì, Italy
e–mail: enrico.gasco@zirak.it

Abstract. Semantic Spaces are a useful tool of Information Retrieval used in many products of Information Technology (Graesser) and have the task to find semantic relationships of analysed texts. In recent years these technologies begin to be used also in different environments as a new analysis tools (Abbot) to find semantic/conceptual structures (Hyman, Bruza) or to analyse the similarity of texts (Widdows). In this talk we want to use Semantic Spaces in a case of History of Physics that we already studied in past years: the links among Mach's critique on absolute space–time and the birth of Einstein's Mach Principle. It's well known that some sentences of the Mach's "Mechanics" have influenced Einstein in the creation of General Relativity and also in the formulation of Mach Principle. A deep analysis of the philosophical assumptions of the works of Mach and Einstein showed that in many aspects the two authors use similar concepts with different shades.

With the Latent Semantic Analysis (LSA), Random Indexing (RI) and Hyperspace Analogue to Language (HAL) we want to study some texts of Mach and Einstein in order to support these thesis. In particular we want to show that the texts where Mach and Einstein seem to have the same meaning (when for example Einstein quotes Mach as his source of inspiration) are instead different and also that the conceptual structure – made from IR analysis of texts, such as the concept of inertia – has some similarities but also differences.

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Natural Sciences at the Service of Narratology: Exploring the Structure of Pirandello's Novels According to the Moebius Ring

Dimitra Giannara
Tor Vergata University, Italy
e–mail: dgiannara@hotmail.com

Abstract. The modern narratology distinguishes three types of narrative structure (step by step, in parallel, in ring–like), which could be enriched by a dynamic, rather overlooked up to now. Identifying the structure of Pirandello's novels, in particular, in an obvious *ringkomposition*, we replace the common ring with the Moebius ring and we arrive to some seditious conclusions about what we thought we knew until now about Pirandello's heroes: from the beginning of their journey, they were directing away from self–reference and formal rules; they were confuting the society without crossing the boundary of its conventional norms but simply by exploring the second side of the ring; their return to the starting–point is always vigorous and unexpected (which invalidates some critics' position that discuss the temporal achrony in Pirandello's works); the main narrative characters do not reject a journey on an ordinary ring but they share generously their experiences from this new two–face and, therefore, twice–fertile voyage with all everyday people.

The present paper will deepen into the concrete analysis of all Pirandello's novels and hopefully it will prove that the protagonists' point of view, their feeling of alienation and the vitality of their hysteron criticism to the others are not random particularities of some awkward persons but a stable grade of awareness, after a trip twice as long inside and outside the ordinary social topology.

Our conjecture has partially been published in our Ph.D. thesis, but we feel it needs to be validated non only from the area of Literature but from Physics as well: mathematics offer the precious two–dimensional instruments; physics apply the interactions in a three–dimensional ambient; and now literature fabricates the two unordered points in a five–dimensional space, in order to represent the modern conceptions of time, space, and causality in narration.

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Thomas Harriot, Modern Science and Inertia

Enrico Giannetto
University of Bergamo, Italy
e–mail: enrico.giannetto@unibg.it

Abstract. In 2008, Matthias Schemmel has published two important volumes: The English Galileo. Thomas Harriot's Work on Motion as an Example of Preclassical Mechanics. Vol 1: The interpretation. Vol 2: Sources. It was the first systematic work in the motion manuscripts by Harriot; for the first time, it reproduces manuscripts within a book. After this first work, some others have been following. However, Schemmel's interpretation and historiographic perspective can be misleading. One cannot refer to Harriot as the English Galileo: it is a rhetoric and anachronistic implicit valuation. One cannot use the historiographic category of "pre–classical mechanics", within which Harriot should have to be included: also this category is anachronistic.

In this paper, I shall deal with the problems correlated by Schemmel to the "principle of inertia" as discussed within Harriot' manuscripts. A right valuation of Harriot's contribution within history of science has to avoid this particular anachronism too.

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Energy, Space and Metaphysics.
Ernst Mach's Interpretation of Energy Conservation as The Principle of Causality

Luca Guzzardi
Department of Physics, University of Pavia
INAF Osservatorio Astronomico di Brera, Milan
e–mail: luca.guzzardi@brera.inaf.it

Abstract. In «Die Geschichte und die Wurzel des Satzes von der Erhaltung der Arbeit» (1872) Ernst Mach expounds his thesis about the principle of energy conservation (EC): far from being a new principle discovered by Mayer, Joule and Helmholtz in the 1840s, which is added to mechanics or implying its decline, he sees it as a cornerstone of mechanics itself from its very beginnings with Stevin and Galilei. In fact, according to Mach EC is nothing but a form of the principle of causality. Nevertheless, historians and philosophers of science seem mostly to have overlooked that in other works (in particular in «Die Mechanik in ihrer Entwicklung historisch–kritisch dargestellt», 1883) Mach refers to causality as embedded within the concept of space, taking an extremely relationalistic view where physical space is simply regarded as the mutual relation amongst things (as anticipated by Berkeley and Leibniz against Newton's idea of an absolute space). How are these quite different ideas of causality articulated? And do they really represent two different kinds of causal interaction? In discussing Mach's interpretation of EC in the context of the development of energy concepts in 19th–century physics and the ideas about causality in the theory of science since Hume and Kant, this paper investigates the close relationship between causality, energy conservation and space in Mach's antireductionist view of science.

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Practicing Practices: The Analysis of Historical Experiment with the Replication Method

Peter Heering
Institute of Physics and Chemistry and its Didactics, University of Flensburg, Germany
e–mail: peter.heering@uni–flensburg.de

Abstract. Experiments and their role in creating scientific knowledge have gained substantial attention in the last decades. Ian Hacking's dictum "Experimentation has a life of its own' (Hacking 1983) can be seen as being a formulation that became itself characteristic for this development. One of the relevant aspects that came into the focus of historians" analysis were performative aspects of scientific experimentation. Particularly the question of how to perform an experiment, which skills are involved and how they are developed became an issue. This results in methodological difficulties as the traces of these skills are difficult to find in classical sources. The knowledge is not only not verbalized, but at least part of this knowledge cannot be verbalized However, in aiming at understanding practices, this knowledge becomes central to the analysis One methodological approach that addresses these aspects is the replication method, which focuses on redoing historical experiments. This method includes also the reconstruction of the historical apparatus as well as the contextualisation of the experiences made during this process.

Particularly the analysis of Joule's work on the mechanical equivalent of heat (Sibum 1995) and that of Coulomb's work on electrostatics (Heering 1994) have gained attention. In my presentation, I will first sketch the methodological approach and then use some other case studies to illustrate the potential as well as the relevance of such an approach to the historiography of science.

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The Drawings concerning Artistic Techniques in the Diderot's Encyclopedia

Emanuela Chiavoni
University of Rome La Sapienza, Italy
e–mail: emanuela.chiavoni@uniroma1.it

Abstract. The objective of this paper is to analyse some drawings relating to the artistic techniques in the Diderot's encyclopedia (first volume, 1751). The encyclopedia is still now considered the laic bible of the century of the lights. It has been selected some of the most significant pictures concerning to drawing, painting, mosaic, sculpture and endgraving, showing the rich interconnections between these different kinds of art and the drawing, from whom all of them was born.

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Michael Faraday and Invisible Forces

Frank A. J. L. James
The Royal Institution of Great Britain, England
e–mail: fjames@ri.ac.uk

Abstract. This talk will examine what was it Faraday's life experiences that led him to prioritise force over matter in his scientific work. As such this will include the development of the field theory of electro–magnetism and its adoption by savants such as William Thomson (later Lord Kelvin) and James Clerk Maxwell in his electro–magnetic theory of light (which he ascribed to Faraday).

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Tradition and Innovation In 13th Century Natural Philosophy: Nikephorus Blemmydes' "Epitomi Fysikis"

Manolis Kartsonakis
The Hellenic Open University, Patras, Greece
e–mail: mankar@sch.gr

Abstract. The study of the essay "Epitomi Fysikis", written by the byzantine scholar Nikephorus Blemmydes (1197 – 1272), highlights one very interesting period of the Byzantine Empire, though inadequately worked out. It is the period of the exiled Greek – speaking Byzantine Empire at Nicaea in Asia Minor (1204 – 1261) during the late Middle Ages. During that time, the Latin – speaking Europe had just reinvented the riches of the ancient Greek sciences and the consequent research was inspired by the thomistic synthesis and the averroic determinism.

Blemmydes' essay has been composed sometime after 1258 and it contains several chapters where the author deals with fundamental principles for Nature (such as the definitions of time and space, motion and its causes, the elements of Cosmos, the eternity) and introduce to us his views on specific issues such as the planetary motions and other astronomical phenomena, interpretations for earthquakes, lightings and thunderclaps, winds, rainfalls etc. Consequently, the "Epitomi Fysikis" can be considered as a full and detailed essay on Nature of that era. On the other hand, it indicates Blemmydes' range of knowledge and his philosophical background as he uses references not only from the platonic and the Aristotelian corpus but from Archimedes, Eratosthenes, Posidonius, Galen, Alexandros of Aphrodisias, Ptolemy, Cleomedes, Ioannes Philoponus, Damascius and Simplicius. So, we intend to show that Blemmydes has confronted natural processes following the attitude of a Christian who was attracted by the ancient Greek philosophy.

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Historical Approach to Physics according to Kant, Einstein, and Hegel

Young S. Kim
Center for Fundamental Physics, University of Maryland, College Park, U.S.A.
e–mail: yskim@umd.edu

Abstract. It is known that Einstein's conceptual base for his theory of relativity was the philosophy formulated by Immanuel Kant. Things appear differently to observers in different frames. However, Kant's Ding an Sich leads to the existence of the absolute reference frame which is not acceptable in Einstein's theory. It is possible to avoid this conflict using the ancient Chinese philosophy of Taoism where two different views can co–exist in harmony. This is not enough to explain Einstein's discovery of the mass–energy relation. The energy–momentum relations for slow and ultra–fast particles take different forms. Einstein was able to synthesize these two formulas to create his energy–mass relation. Indeed, this is what Hegelianism is about in physics. Isaac Newton synthesized open orbits for comets and closed orbits for planets to create his second law of motion. Maxwell combined electricity and magnetism to create his four equations to the present–day wireless world. In order to synthesize wave and particle views of matter, Heisenberg formulated his uncertainty principle. Relativity and quantum mechanics are the two greatest theories formulated in the 20th Century. Efforts to synthesize these two theories are discussed in detail.

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The Earth Floats Unsupported in Space

Radim Kočandrle
Research Centre for the Theory and History of Science
University of West Bohemia in Pilsen, Czech Republic
e–mail: rkocandr@kfi.zcu.cz

Abstract. Aristotle reported that among the ancients, Anaximander of Miletus had said that the earth stays motionless in place because of symmetry–uniformity. Aristotle argued that what is situated in the middle and is equally distance from everything has no inclination to move up but rather than down or sideways. This argument was often believed to be one of the first instances of an argument based on the principle of sufficient reason. Hippolytus adds that, according Anaximander, the earth is suspended, supported by nothing, because its' equal distance from everything. But the same argument is disputably ascribed also to Democritus. Moreover, Anaximander's successor Anaximenes already explained the position of the earth because it rests on the air like lid. Furthermore, Simplicius said that Anaximander explained the stability of the earth both by its symmetrical position and by the support of the air. Can we pose the question if Aristotle made a mistake in his report? From doxography we know that Anaximander's conception of cosmology supposed a flat earth at the centre of the concentric wheels of the celestial bodies – the sun, moon and stars. In my talk, I will speak on the explanation of the immobility of the earth which can be firstly based on the very conception of cosmogony and the assumption of the role of the air–mist. Further, I will mainly focus on the argument which is valid only in the plan view (horizontal cross–section) of the universe. In this connection, I will discuss the question of the stability of the earth as it is related to the existence of the map of the universe.

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Confirming SRT despite Himself: Ives' Neo–Lorentzian Theory and The Ives–Stilwell Experiment (1937–1941)

Roberto Lalli
Program in Science, Technology, and Society, Massachusetts Institute of Technology, Cambridge, U.S.
e–mail: rolalli@mit.edu

Abstract. In 1938 and 1941 the AT&T's Bell Laboratories director of the electro–optics research department Herbert Eugene Ives (1882–1953) performed the Ives–Stilwell experiment, called after him and his Bell Labs collaborator G. R. Stilwell. This experiment showed an optical effect that corresponded to the so–called transverse Doppler effect, namely a displacement of the spectral lines with respect to the classical optical Doppler effect that had been anticipated by Einstein in the framework of SRT in 1905. Some physics textbooks describe this experiment as the first direct demonstration of the validity of the time dilation formula of SRT. Conversely, Ives regarded the result of the experiment as a proof of the Larmor–Lorentz hypothesis of the contraction of the time–pulse of an atomic clock in motion through the stationary ether and did not even mention SRT in the interpretation of the experiment. Despite of the importance physicists gave to the Ives–Stilwell experiment as a confirmation of SRT and the philosophically revealing contradictions between Ives' theoretical presuppositions and the common interpretation of the experiment, historians have not deepened the complex epistemic factors that led to the fulfillment of the experiment and influenced its reception. The aim of this communication is to address this shortcoming with an analysis of Ives' papers on the experiment and their relation with the history of the relativistic Doppler effect up to the time in which the scientific community established the Ives–Stilwell experiment to be a full confirmation of SRT.

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Stars, Numbers and Symbols in the Fresco of Marino Mithraeum

Marcella Giulia Lorenzi
University of Calabria, Italy
e–mail: marcella.lorenzi@unical.it
Mauro Francaviglia
Department of Mathematics, University of Torino, Italy
e–mail: mauro.francaviglia@unito.it
Luciana De Rose
Department of History, Università della Calabria, Cosenza, Italy
e-mail: lucianaderose@libero.it

Abstract. The fresco of the Mithraeum (a place of worship for the followers of the mystery religion of Mithraism) in Marino, near Rome, is unique in its kind. At the bottom of a long rectangular underground room, in the front wall, the painting shows Mithras in its most classical iconography, which includes all the symbols related to the mystery cult. The peculiarity consists in the starry sky, depicted on the flap of the cloak of the God. Unlike other frescoes that are in fact similar and more or less contemporary – such as those of the Barberini Mithraeum in Rome and the Santa Maria Capua Vetere one in Campania (where the seven stars are not placed within a context, but are sparse in the mantle) – in the case of Marino the sky with the is highlighted and the stars are located in a structured way, four arranged in a square and, below the belt, three in a straight line. The interpretation we give provides several levels of interpretation: the symbolic/worship, symbolic/astronomical and symbolic/numeric.

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Paolo de Saint Robert and *Receding of the Glaciers*

Federica Maffioli
Cultural Association Saint Robert, Castagnole delle Lanze, Italy
e–mail: federicamaffioliarchitetto@yahoo.it
Gianfranco Medici
Cultural Association Saint Robert, Castagnole delle Lanze, Italy
e–mail: gian.medici@alice.it

Abstract. The count Paolo Ballada of Saint Robert (1815–1888) was scientist and mainly busy in mechanics and thermodynamics. In his memory *Receding of the Glaciers* ("Perché i ghiacciai si vadano ritirando") Saint Robert (1815–1888) remarks how most of the area of prehistoric Europe was covered by forests, rivers, lakes, ponds and marshes. The Sahara desert was covered by the sea, and provided by a huge evaporating mass. Consequently, the climate of Europe at that time had to be very wet with a significant presence of steam that reduced the temperature difference between summer and winter. Paul of Saint Robert focused then on his theory of the evolution of glaciers in the Alps over the last 60 years on three sample cities: Turin, Geneva and Paris. From the meteorological statistics he notices a significant reduction in water fallen during the cold season. In the same three sample cities, he also reports an increase in average summer temperature of one degree. The deforestation of the mountains and plains and the emptying interventions of ponds and marshes are making the climate drier with consequent increase of the temperature difference between summer and winter: the level of permanent snow rises again and glaciers retreat.

In our talk we will discuss the scientific conclusions of Saint Robert concerning the retreat of glaciers that apparently are not attributed to causes such as cosmic or telluric ones as someone thought at that time, but it is simply due to meteorological causes depending in part upon the prolonged action of mankind on the earth surface.

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Attributions and Misattributions at the Origins of Special Relativity: Minkowski's "Lorentz's Theorem"

Marco Mamone Capria
Dipartimento di Matematica, University of Perugia, Italy
e–mail: mamone@dmi.unipg.it
Maria Grazia Manini
Dipartimento di Matematica, University of Perugia, Italy
e–mail: mariagrazia.manini@yahoo.it

Abstract. In the founding texts of a new scientific theory it is usually possible to find very short historical outlines, which are offered by the authors to enable the reader to place correctly their own specific contributions. The importance of these history–capsules cannot be overrated, since they tend to become in due time the starting–point for professional historians, sometimes in a critical fashion, much more often in basic agreement with the attributions made by the main participants in a scientific discovery. We will examine an example of this phenomenon concerning a conceptual entity that H. Minkowski introduced in his special relativity papers, and that he called the "Lorentz's theorem". In particular, we will show that the indication to contemporary scientists and future historians implicit in this name and its accompanying explanations involved a considerable distortion of the historical evidence.

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The Discovered Archive: the Scientific Papers of Alessandro Serpieri

Roberto Mantovani
Physics Laboratory: Urbino Museum of Science and Technology, Urbino University, Italy
e–mail: roberto.mantovani@uniurb.it

Abstract. Active in Urbino since 1847, the scientist and Piarist Alessandro Serpieri (1823–1885) lived in Raffaello's home town until the end of 1884, the year in which, due to the changed hostile political conditions, he moved to Florence to take the direction of the famous College of Piarist, *Badia Fiesolana*, very close to Firenze. A few months later, he died on February 22, 1885. Moving from Urbino To Florence Serpieri took with him all of personal papers, which were the result of an intense and fruitful scientific activity lasted almost 40 years. These papers, for few years thought to be lost or destroyed, were found at the beginning of this current year in Florence, into the Historical Archive of the Pious Schools. The remarkable lot of papers of the archive covers the period 1850–1884 and consists of loose sheets, notebooks (at least seventy) still in good condition, full of notes, studies, science researches and school lessons, which were written by Serpieri during his stay in Urbino when he was professor of physics both at the College of Nobles (the current Raphael College of Urbino) and at the University. While teaching, he also studied deeply into Physics, Astronomy, Seismology and Meteorology. For this last subject, a rich and complete instrumental series of meteorological observations, covering the years from 1850 to 1884, has been found in the archive. These meteorological notebooks, for many years thought to be lost, were patiently, year after year, compiled by Serpieri with great skill and accuracy; its discovery made possible to complete the series of weather data 1884–2012 already in possession by the Meteorological Observatory of Urbino. All manuscripts found, were recently brought back to Urbino to be shown at the great exhibition with the title "*Father Alessandro Serpieri. Omnia in perfectione fecit! The places, the manuscripts, the scientific instruments*". This exhibition took place at the Raphael College of Urbino, from 7 to 24 June 2012. This talk will focus on the preliminary study of papers referred primarily to physics, with a wealth of information and facts, such as: handwritten notes taken from science journals of the time, studies on telegraphy, spectroscopy, electric measurement units and electric potential; finally, I will discuss the Serpieri notebooks relating to his physics lectures, full of observations, experiments and descriptions of scientific instruments.

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World Systems Compared: Manuals of Astronomical Instruments between Nicholas Bion and Minor Artisans In XVII Century

Flavia Marcacci
Dipartimento di Scienze di base e fondamenti, Università degli Studi di Urbino "Carlo Bo", Italy
e–mail: flavia.marcacci@fastwebnet.it

Abstract. The production of terrestrial and celestial globes was significant in XVII century: F. Bianchini (1662–1729) is one of most famous name for the construction of the globe of Venus. Construction of terrestrial or celestial globes was a practice very extensive, and carried an element of prestige for many technicians. Among these craftsmen, the famous Dutch cartographer and publisher William Janszoon Bleau (1571–1638) qualified himself as an instrument and globe maker under direction of Tycho Brahe. In its *Institution astronomique* Blaeu explained differences between techniques of construction of globes in a Ptolemaic or Copernican way. Less renowned N. Bion (1652–1733) was a globe maker, too. Whose laboratory was in Paris and he received the title of Engineer of the King for Mathematical Tools, although no major technical innovation can be attributed to him. He was undoubtedly very clever in manually constructing globes, sundials and mathematical instruments, but in particular, unlike his colleagues, he published several pamphlets and treatises that must have made him somewhat famous: among them is *L'usage des globes celestes et terrestres*, published in some six editions between 1699 and 1751. In this instruction manual he described how constructing globes in a Ptolemaic or Copernican system. This is an interesting and unusual proof of persistent problem of comparison between systems of world in XVII century.

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Paolo de Saint Robert and the *True Meaning of a Tercet of Dante*

Gianfranco Medici
Cultural Association Saint Robert, Castagnole delle Lanze, Italy
e–mail: gian.medici@alice.it
Federica Maffioli
Cultural Association Saint Robert, Castagnole delle Lanze, Italy
e–mail: federicamaffioliarchitetto@yahoo.it

Abstract. The count Paolo Ballada of Saint Robert (1815–1888) was scientist and mainly busy in mechanics and thermodynamics. Contrarily to Dante's commentators upon masterpiece on *the first canto of Purgatory*, he provided a scientific explanation upon *the true meaning of a tercet of Dante* ("Sul vero significato di una terzina di Dante"): "Then I turned to the right, setting my mind Upon the other pole, and saw four stars Not seen before except by the first people" (Purgatory l 22.24). It regards with why the four stars forming the constellation of Southern Cross were not visible from Europe excepting from the first people some thousands years before. The explanations provided by the commentators are based on fanciful assumptions referring to the four Cardinal Virtues (prudence, justice, fortitude and temperance) honored by the ancients and then forgotten.

In out talk we present how Saint Robert showed that the stars of the Southern Cross visible to first people but at the time of Dante no longer visible from Europe, will return visible after some thousands years, as a consequence of an astronomical phenomenon called the *precession of equinoxes*. Even today, in the most important commentaries on the Divine Comedy is not mentioned the precession of equinoxes and is never clarified the meaning of the verse *not seen before except by the first people*. By considering Dante's knowledge in astronomy, we will focus on Saint Robert's explanation discussing his correct interpretation of the tercet of *the first canto of Purgatory* (*Ibidem*).

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The Metallurgical Microscope

Giorgio Mirandola
University of Bergamo, Italy
e–mail: giorgio.mirandola@unibg.it

Abstract. A metallurgical microscope is an optical microscope which differs from other microscopes in the method of specimen illumination. Since metals are opaque substances they must be illuminated by frontal/reflected lighting; therefore on metallurgical microscopes the light source is located within the microscope tube. This is achieved by a plain glass reflector installed in the tube, or by similar means. This is known as epi–illumination. Light in a dissecting stereo microscope is also reflected but it comes from an illumination source from the side. There are two designs of metallurgical microscope: upright and inverted The upright microscope is used for examining smaller specimens mounted on slide material. The inverted model is used for applications that range from the examination of thick and large metal or raw material samples to big or heavy samples. In the Nineteenth Century the first metallurgical microscopes were common biological microscopes adapted by some simple accessories to the use in reflected light. In the Twentieth Century metallurgical microscopes were specifically planned and built and were often very complex and heavy instruments. This paper explains the evolution of this particular kind of microscope from the beginning to the present days.

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Search of the Higgs Boson at the *Large Hadron Collider*

Aleandro Nisati
I.N.F.N. Sezione di Roma, Italy
CERN, Geneva, Switzerland
e–mail: nisati@cern.ch

Abstract. The Higgs boson is the only missing elementary particle of the *Standard Model* of particles and fields. In the Standard Model, the non–zero vacuum expectation value of the Higgs field breaks the electroweak gauge symmetry. It is the simplest process capable of giving mass to the gauge bosons and fermions. Its quantum would be a scalar boson, the only one in this theory. A brief overview of the searches for this particle is given. In particular, the latest results of the search for this particle at the *Large Hadron Collider* (LHC) are summarized and discussed, focusing on the recent observation of a new boson by the experiments *A Toroidal LHC ApparatuS* (ATLAS) and *Compact Muon Solenoid* (CMS) at the LHC, with a mass around 126 GeV. Preliminary available data show that this particle is consistent with the boson predicted by the *Standard Model*. However, more data are needed to perform precision measurements of the physics properties of this new boson, and verify whether this is the Higgs boson predicted by *Standard Model*.

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Physics and Mathematics without Coordinates

Walter Noll
Carnegie Mellon University, Pittsburgh, United States of America
wn0g@andrew.cmu.edu

Abstract. To get your attention, I will start with a quote from the most famous scientist of the first half of the 20th century:

> Why were another seven years required for the construction of the general theory of relativity. The main reason is the fact that it is not so easy to free oneself from the idea that coordinates must have an immediate metrical meaning.

The following quote is from a far less famous scientist:

> The approach of this treatise is conceptual, geometric, and uncompromisingly coordinate–free. In some of the literature 'tensors' are still defined in terms of coordinates and their transformations. To me, this is like looking at shadows dancing on the wall rather than at reality itself.

The first quote is, of course, by Albert Einstein, and is cited in Section 1.2, (entitled *spacetime with and without coordinates*) of the book *Gravitation* by Misner, Thorne, and Wheeler. The second quote is by a far less famous scientist, namely me (Walter Noll) in part F of the introduction to the book entitled *Finite–Dimensional Spaces, Algebra, Geometry, and Analysis*.

From Descartes (1596–1650) until now, coordinates have played a useful and crucial role in combining the geometry as developed by the Greeks with the Analysis that began to be developed at the time. However, it is now obsolete to use coordinates when dealing with conceptual issues and more efficient to use more sophisticated mathematical tools.

Of course, coordinates are still needed when dealing with specific practical situations. More often, it is most useful to employ not Cartesian coordinates but cylindrical, spherical, barycentric or other kinds of special coordinate–systems. The now well–known GPS system is a very sophisticated modification of a barycentric system.

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The Role of the Concept of Work in the Development of Applied Mechanics

Agamenon R. E. Oliveira
Polytechnic School of Rio de Janeiro, Federal University of Rio de Janeiro, Brazil
e–mail: agamenon.oliveira@globo.com

Abstract. Applied mechanics and further developments of industrial mechanics are a complex result of the work of many places and institutions in several different countries. In this paper, we are mainly concerned with the contributions of French *polytechnicians* mainly Lazare Carnot first general theory of machines and Coriolis first textbook on applied mechanics: *Du Calcul de l´Effet des Machines.* These two books have in common the use of the concept of work as a fundamental step to build a general theory of applied mechanics within the framework of Rational Mechanics. Lazare Carnot started to develop his general theory of machines applying d´Alembert´s principle. In this approach he found the origin of the difference between the concept of *vis viva* (kinetic energy) and the moment of activity (work) which operates with these two concepts for a machine and uses a kind of equivalence between them. After Lazare Carnot, the most important step towards the construction of an applied mechanics for machines was made by Coriolis in his 1829 work above mentioned In the twenty–five years which separates it from Carnot´s *Principes* no important intermediate work was published, apart from the notes and additions made by Navier (1785–1836) in *Architecture Hydraulique* by Bélidor (1693–1761). What is new in Coriolis´s approach is the extensive use of the concept of work with the mathematical formalism which is quite different from Newtonian concepts. It is an alternative way to solve a given mechanical problem which is to discover the amount of work generated by the system and thus try to find the *living forces* involved In other words, it is the same as the work–kinetic energy principle. In this context, Coriolis corrected the expression for kinetic energy introducing the constant ½ in the old expression mv2. In addition he adopted the term *work* to represent the product of a force by its displacement along the force trajectory, replacing the previous nomenclature.

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The Laws of Statics in the Work of Archimedes as Formalized by Salvatore Notarrigo

Angelo Pagano
I.N.F.N. Sezione di Catania, Dipartimento di Fisica e Astronomia, University of Catania, Italy
e–mail: angelo.pagano@ct.infn.it

Abstract. Salvatore Notarrigo died on March 1998. He was full professor at the Department of Physics and Astronomy of Catania University, member of the Italian Society for History of Physics and Astronomy. Notarrigo has dealt with the history of physics and epistemology also reviewing the contribution of the ‘‘Scuola Italica’’, school of thought promoted in Sicily and Calabria as early as VI century (BC), and of which Archimedes (230 BC) was one of the most preeminent scientists. As it is known, the work of Archimedes was characterized for the wide range of scientific subjects. This paper reports on a Notarrigo’s work about the laws of static created by Archimedes (equilibrium under gravity of plane figures). Notarrigo submitted to a severe criticism the work of Archimedes and he formalized a part of it with the help of symbolic logic. Notarrigo’s formal interpretation of the work of Archimedes allows us to clarify the epistemological position of the great Syracusan also in comparison with those criticisms advanced on XIX century by Ernest Mach, criticisms that have been the subject of extensive discussions by scientists.

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Field Equations or Conservation Laws?

Marcella Palese
Department of Mathematics, University of Torino, Italy
e–mail: marcella.palese@unito.it

Abstract. In the context of Noether conservation laws associated with some 'variational' invariance of global Euler–Lagrange morphisms of local problems of a given type, the question arises whether we should be interested in conservation laws different from those directly associated with invariance properties of field equations. The answer to this question relays on Emmy Noether's famous and celebrated paper *Invariante Variationsprobleme.*

As it is well known, Noether's paper was motivated by the fact that, although the gravitational field equations were global, the associated conservation laws found by Einstein by a nonvariational approach were not (think of the well known energy–momentum pseudo–tensor).

The underlying idea was that of looking for conservation laws coming from invariance properties of a (possibly local) Lagrangian (rather than a field equation solely) to find a way of associating global conservation laws with the gravitational field.

Explicitly, in the introduction of her paper, Noether wrote: Ueber diese aus Variationsproblemen entspringenden Differentialgleichungen lassen sich viel praezisere Aussagen machen als ueber beliebige, eine Gruppe gestattende Differentialgleichungen, die den Gegenstand der Lieschen Untersuchungen bilden, so underlining the relevance of the study of differential equations generated by an invariant variational problem in its whole rather than of arbitrary differential equations admitting a Lie group of symmetries. It is pointed out that considering invariance of variational problems the issue is a major refinement in the results: to symmetries of equations could correspond conservation laws which have a nonvariational meaning and thus cannot be characterized in a similar precise manner.

In fact, contrarily to what sometime improperly stated, Noether's Theorem (I and II Theorems actually) were not `formulated for Euler–Lagrange equations in field theory', rather they are statements about the invariance of the variational problem (in other words, of the action integral) with respect to a finite continuous group of transformations and an infinite continuous group of transformations, respectively.

The direct object of Noether's investigations are what she calls Lagrangeschen Ausdruecke; d.h. die linken Seiten der Lagrangeschen Gleichungen, which we shall call hereafter Euler–Lagrange expressions. The accent is not put on field equations although her results have, of course, also consequences concerning invariance properties of equations.

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Historical Epistemology of Science. On the Emergency of Physical and Mathematical Objects in the 19th Century

Raffaele Pisano
"Centre François Viète Épistémologie, Historie de la Science et de la Technique",
Université de Nantes France
"RCTHS", University of West Bohemia in Pilsen, Czech Republic
e–mail: pisanoraffaele@iol.it

Abstract. *Historical epistemology of science* is one of the possible approaches to understanding the history of the foundations of science combining historical/epistemological aspects (primary sources, historical hypothesis, shared knowledge, epistemological interpretations) using logical and mathematical inquire. By following this historical–methodological standpoint, *what are physics and mathematical objects in a theory?* Generally speaking focusing on *mathematical and physical quantities* within experiments, modeling, properties, existences, and structures one can see some theories where physics and mathematics work in a unique discipline: *physics mathematics* (or *mathematics physics*). It is not a mathematical application of physics or vice–versa, but rather it a *new* way to work with science. New methodological approach to solve physical (in origin) problems where the quantities may be physical and mathematical at the same time (first novelty), measurements are not a priority or a prerogative (second novelty) to make a coherent physical science. It is a structured discipline on *relationships of thought* among *mathematical quantities* and *physical structures* (including logic and language) in order to "[...] reducing [experimental electric and magnetic] phenomena into scientific form [...]" (Maxwell 1865, p 459). It has its own hypotheses, methods of proofs, internal coherent logic, where a change of mathematics produce a change in both significant physical processes and interpretations of *physical quantities.* Some theories became mechanical/rational/analytical, where principles *ne présuppose aucune loi* [object] *physique* and experimental studies were not in attendance. E.g.: *Traité de Mécanique céleste* (1805) by Laplace, analytical approach without considering nature of heat/experiments (1807; 1822) by Fourier, Ampère showed that a mathematical approach (1820; 1828) basing on previous Ørsted's experiments (1820) where new and not mathematical interaction, outside of mechanical foundations, can be observed Nevertheless, the lacks of *mathematical objects* in Sadi Carnot's theory (1824) and in *Faraday*'s *Experimental Researches in Electricity* (1839–1855) were emblematical expectations. Faraday without formulas introduced the basis for the concepts of field and vectors in electromagnetic induction theory. Differently, in late (electrothermal and) electromagnetic theory an advanced use of mathematics was presented (1864–1873) by Maxwell and mechanically (*vortex*) explain Faraday's phenomena.

In my talk, by following Maxwell's physics mathematics, reflections concerning physical and mathematical objects differently used by Faraday and Maxwell in their theories would be discussed

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The Concept of Force in Johannes Kepler

Raffaele Pisano
CFV–University of Nantes, France/RCTHS–University of Pilsen, Czech Republic
e–mail: pisanoraffaele@iol.it
Paolo Bussotti
Edizioni Nazionale Enriques, Italy
e–mail: paolo.bussotti@alice.it

Abstract. Nowadays the dynamic concept of *force* is usually associated with Newton standard form. Before Newtonian science, its status was practical, ambiguous (from scientific–measurements modern standpoint etc.) or, at least, polysemous; even if significance and early interesting concepts are possible to read before Newtonian's *Principia*, too. Generally speaking, the *force* was almost invariably connected to vitalistic and astrological items, e.g., the celestial bodies was in general seen as bodies that exerted an influence on the human things and, with regard to the movements in the sky, there was no research to look for the kind of *force* that could be the responsible of such movements. In the *Mysterium Cosmographicum* Kepler was interested to look for the causes of the movements of the planets in the sky. In the final sections of his book, he mentioned a *force* that could be the responsible of the motion. (At the beginning this *force* was still involved with vitalistic points of view). Basically Kepler's concept of *force* is not suitable to develop a satisfying mechanics, but the idea to provide a dynamical foundation to the kinematical results was revolutionary.

In our talk we will focus on physical–historical and epistemologically comprehension of Kepler's concept of *force* in the comparison with Newton's standard concept of *force* looking for the scientific foundational similarities and the differences.

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The Tortuous Path to High Mountain Astrophysics. The Construction of a Jesuit Observatory in the Sierra Nevada (1965–1969)

Matteo Realdi
Centre for the History of Science, Autonomous University of Barcelona, Spain
e–mail: matteo.realdi@uab.cat

Abstract. This presentation aims at giving a historical reconstruction of the foundation of a Jesuit observatory on a mountaintop in Southern Spain. The analysis addresses the activities carried out from 1965, when an astronomical station in the Sierra Nevada was conceived by the director of the Cartuja Observatory, to 1969, when this small observatory was completed, and a scientific collaboration for astrophysical research with the Royal Greenwich Observatory was eventually inaugurated The very good conditions of the night sky in the Sierra Nevada represented the key issue which drove the attention of Spanish and English astronomers to the development of astrophysical projects in Southern Spain. The construction of the astronomical station became a thorny question, since issues such as funding, negotiation, and control were deeply involved beyond the scientific aspects. The building process was indeed characterized by technical, financial, and political problems, due to the difficulty to mediate between the Society of Jesus, British and Spanish scientific institutions, and the Spanish Government.

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Developments of English Science and Scientific Popularization between '700 And '800

Arcangelo Rossi
Dipartimento di Storia, Società e Studi sull'Uomo, Università del Salento
e–mail: arcangelo.rossi@unisalento.it

Abstract. In the climate of the late XVIII century's industrial revolution a new opening took place in England towards scientific education and popularization. This opening can be fully understood only by paying attention to the whole dynamics of the connected social and cultural changes concerning, in particular, the relationships between science and technique and among the different social categories which were their holders. In this contribution, I will restrict myself to outlining the most essential scientific–technological, cultural and institutional frame inside which those important changes took place, marking the passage from the tradition of the XVIIIth century's natural philosophy to the new XIXth century's English science and technology. A passage which was accompanied by a new development of scientific popularization, expressing a larger and larger diffusion of science also linked to immediate productive interests, in an almost consolidated bourgeois society.

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Techniques and Methods of Italian Architectural Drawings of the Early XX Century

Antonella Salucci
University "Gabriele d'Annunzio" of Chieti, Pescara, Italy
e–mail: antosalucci@unich.it | a.salucci@gmail.com

Abstract. This paper shows the results of a research experience carried out on a significant body of architectural competition drawings, with the aim to define a piece of the evolution of the Italian architectural language of the early years of the Twentieth Century.

Contemporary expressive modes enable the diffusion, the sharing and the open documentation of information through interactive visualizations, therefore communication is a necessary medium for documentation, knowledge, safeguard, preservation and management of cultural heritage.

By reading the archive documents, the iconographies and the original project drawings, it is possible to add another piece to the history of representation, thus defining some keys to the reading of the data of the environmental and architectural heritage.

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The Variable Radius Cartography – History and Perspectives of a New Discipline

Giancarlo Scalera
INGV – Istituto Nazionale di Geofisica e Vulcanologia, Roma, Italia
e–mail: Giancarlo.scalera@ingv.it

Abstract. Perhaps the map that Toscanelli sent to Columbus was an unconscious application of cartography at a smaller radius than the real. The first really conscious attempts to represent the geography of Earth on globes of radius less than the current one occurred after the formulation of the concept of expanding Earth through geological time. In 1928 J.A.H. Kerkhoff. (Under the pseudonym *'Aero–dilettant'*) published a series of paleogeographic globes on which the modern oceans disappeared With the same artisan methods of transfer continental outlines from a sphere to a smaller one, in 1933 O.C. Hilgenberg represented three different geological epochs, and, later, for the first time mapped paleopoles with their site–pole segments of meridian. Even today the traditional method of Hilgenberg is followed by senior researchers (Vogel, 2003) and younger geologists (Maxlow). In England Hugh Owen applied the methods of traditional cartography to the variable radius one. His *'Atlas of Continental Displacement'* was in the 70s and 80s, for this discipline, a real milestone. While in the field of constant radius paleogeography the adherents to plate tectonics created many computer codes of automatic mapping (Bullard et al., 1965; Smith & Hallam, 1970, Scotese et al., 1979, and many others), in the variable radius field few tried to reach the same task. In 1972 in United States a first very simple attempt (but was not furtherly developed) came from a private, R.B. Perry, followed by the still not–computerized Atlas of Owen, and both them constituted inspiration for the construction of a variable radius mapping code at INGV, with which it is now possible to represent paleopoles, site–pole segments of meridian, and their uncertainty ellipses (Scalera, 1988, 1990). In all paleogeographic reconstructions of the various authors, cartography is used in a way more or less complex, more or less intertwined with other disciplines and databases, not as pure representation or in the spirit of the simple '*fits*' that supported plate tectonics, but as experiments of greater complexity with a value of proof in favor of the planet expansion. Today a common feeling among followers of the expanding Earth is that is now necessary to develop an interactive and '*user friendly*' program code, which could be distributed or used in the web.

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Early Modern Histories of Astronomy: on Searching for Antediluvian Astronomy and Vision of Astronomical Progress

Daniel Špelda
RCTHS, University of West Bohemia, the Czech Republic
e–mail: spelda@kfi.zcu.cz

Abstract. The Jewish historian Flavius (1st century A.D.) in his work Antiquitates judaicae (I,69–71) stated that Adam and his descendants before the Flood had possessed extensive astronomical knowledge. Renaissance astronomers took this information very seriously and thought that it is necessary to find, restore (*instauratio astronomiae*), or emulate this ancient antediluvian astronomy of the biblical patriarchs (for example Tycho Brahe, *De stella nova*). Even in the 17th century, many surveys of the history of astronomy appear to have been convinced of the existence of Adam's antediluvian astronomy; for example, the idea still can be found in the Cassini's history of astronomy from 1699. Gradually, however, among astronomers and the early historians of astronomy and mathematics (e.g., Weidler, Esteve, Goguet, Montucla, Bailly) the view prevailed that the true astronomy is not hidden in the past of the human race, but awaits humanity in the future as a result of long–term, international and trans–generational cooperation. My talk deals with the early modern surveys of the history of astronomy. I will discuss the transition from searching for the true astronomy in the past to the belief in astronomical progress, according to which we can expect full understanding of the cosmos in the future. Thematically, my talk is a contribution to a neglected area of research: the history of history of astronomy.

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Beaten by a Nose.
How did Félix Bernard Contribute to the Beer's Law of Colorimetry?

Marco Taddia
Department of Chemistry "G. Ciamician", University of Bologna, Italy
e–mail: marco.taddia@unibo.it

Abstract. Although sometimes labeled Beer–Lambert–Bouguer law, the fundamental equation describing absorption of electromagnetic radiation is more familiarly known as Beer–Lambert law or simply Beer's law, without taking into account the Bouguer contribution. This happens in textbooks, scientific papers and also in some official documents of IUPAC (International Union of Pure and Applied Chemistry). Although abbreviations can save time for users, they can be misread. Recently, it has been shown (Taddia, 2008) that Beer–Lambert law is a typical equation with the many fathers. Johann Heinrich Lambert (Muhlhausen, 1728 – Berlin 1777) is usually given credit for deriving the exponential law in the modern form. He is often referred to as the "Father" of photometry because he coined the term in 1760 by his Tratise "Photometria, sive de Mensura et Gradibus Luminis, Colorum et Umbrae" (Lambert, 1760). August Beer (Trier, 1825 – Bonn on the Rhine, 1863) established indubitably the reciprocal relation between thickness and concentration in his paper "Bestimmung der Absorption des rothen Lichts in farbingen Flüssigkeiten" (Beer, 1852). However, the story is a little more complex than that (Malinin, 1961; Johnston, 2001). Pierre Bouguer (1698–1758) anticipated Lambert's contribution by 31 years (Bouguer, 1729). He stated empirically that the logarithm of the quantity of light received is inversely proportional to the thickness before Lambert's *Photometria*. Moreover, Lambert himself frequently mentions the book of "famous Bouguer". It is also debatable whether August Beer should or not share his fame with the French physician Félix Bernard (Bordeaux, 1816–1865), a lycée teacher who occupied the chair of Physics at Clermont–Ferrand. In the same year (1852), only three months after Beer, Félix Bernard arrived independently at a similar relationship between the light absorption, thickness and concentration of the absorbing medium (Bernard, 1852). This paper will discuss in some detail the Bernard's specific contribution.

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Art and Science of Building in the Work of Giuseppe Damiani Almeyda

Cesare Tocci
Department of Structural and Geotechnical Engineering, University of Rome La Sapienza, Italy
e–mail: cesare.tocci@uniroma1.it

Abstract. The paper proposes a thought about the forms by means of which the structural control of the architecture has been historically implemented and the evolution that these forms have gone through till the present condition. The starting point is supplied by the examination of two projects of the XIX century architect–engineer Giuseppe Damiani Almeyda (1834–1911) – the plan for the metallic cover of the Politeama theatre in Palermo (1875) and the plan for the reconstruction of the masonry dome of the Cathedral of Marsala (1893) – which are emblematic of two different conditions in which the structural control of the architecture can be carried out, being the diversity related on the one hand to the constructive technique employed by the engineer and on the other hand to its theoretical background. These conditions are moreover representative of two successive moments of the evolutionary process that has led to the current way of thinking to the structural control of the architecture, with the particularity that the masonry dome, though being chronologically the most recent, represents the more ancient condition, while the metallic cover, that comes before the first one of about twenty years, represents the more modern condition. In particular, the scientific and cultural environment within which the structural planning of the metallic cover of the Politeama theatre is carried out shows undeniable analogies with the engineering production of the second half of the nineteenth century, highlighting the changes occurred in structural planning when the synthetic approach of ancient architecture gave way to the analytic approach of modern engineering. Far away from the sectoral specialization of today's technical culture, and endowed on the contrary with a surprising competence on various fields of architecture, Giuseppe Damiani Almeyda constitutes a paradigmatic figure of that particular historical moment in which the transition from the ancient art of building to the modern strength of materials occurred

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The Scientific Work of Antonio Maria Jaci in Messina

Maria Luisa Tuscano
Associated INAF–Osservatorio Astronomico di Palermo Vajana G, Italy
e–mail: mltuscano@libero.it

Abstract. Antonio Maria Jaci (1739–1815), born in Naples, spent his life teaching mathematics in Messina at the clergy seminary. His research interests concern both theoretical aspects and applications in astronomy, navigation and physics with personal contributions praised in his biographies.

His commitment to the problem of determining longitude in the sea, the complex design of the *meridiana* for the Dome of Messina, the attempt to solve the irreducible case of cubic equations, constitute an effective witness of a lively and prolific commitment that deserves a critical analysis also thanks to the discovery of additional documents, currently under study in collaboration with the astronomical Observatory of Palermo.

Thus we try to continue and strengthen a research already undertaken in recent years, in order to get back to Antonio Maria Jaci a more adequate scientific profile, putted in the shadows in ancient biographies because of the frequent attention to his life's difficulties. This also aims to solicit further investigations to try to recover his missing manuscripts, and what may still exist of his prestigious meridian line.

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Galileo's Use of Practical Knowledge

Epaminondas Vampoulis
Aristotle University of Thessaloniki, Greece
e–mail: vampoulis@edlit.auth.gr

Abstract. In this paper a new look upon Galileo's *Discorsi* is proposed, a look based on the use of practical knowledge made in this major work. It is interesting to note that Galileo places the three interlocutors of the dialogue in an arsenal, and that this place determines the subject of the conversations they will have, especially of their conversation on the problem of the resistance of matter to fracture. The study of this problem in the *Discorsi* is related to significant practical consequences as well as to the work which is done in the arsenal. According to Salviati and Sagredo who open the dialogue, one can acquire knowledge in the area of mechanics by making use of the knowledge accumulated by the artisans who work in the arsenal. To be more precise, the total amount of the observations one can acquire in the arsenal does not contain just those gathered by the artisans themselves, but consists of a larger group of observations some of which come from their predecessors. Having in their minds the total amount of these observations, some artisans of the arsenal are according to Salviati well equipped in order to develop their own thoughts by using their own reason. Accordingly, the fine use of reason comes after the collection of a certain number of observations and rational thinking is presented as the outcome of the existence of these observations. So, in the opening paragraphs of the *Discorsi* we find ourselves in front of a very well calculated presentation of the way Galileo thinks but also works. I believe that we are entitled to read these passages as a presentation of a pattern containing all the steps through which Galileo proceeds in order to attain a rational comprehension of the physical world. Such a pattern seems to take experience as its starting point and proceeds as follows: for Galileo, observations made attentively and systematically have the power to yield rational explanations of the facts. This procedure entails the transition from observations to well organized experiments, given that these experiments are the means through which a rational theory elaborated in all of its details is constructed

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Giordano Bruno and the Philosophical use of the Proportional Eight Spikes Compass

Valentina Zaffino
Faculty of Philosophy, Pontifical Lateran University, Vatican City State
e–mail: filosofazo@yahoo.it

Abstract. The proportional eight spikes compass, invented in the 1567 by the Italian mathematician Fabrizo Mordente, is an instrument that interested much Giordano Bruno. This tool approached Bruno to the technical and mechanical aspect of the Renaissance sciences and he also used this compass in a philosophical and metaphysical way.

The Mordente's compass came first of Galileo's one and it was equipped with adjustable and sliding sliders with spikes perpendicular to the both axis legs and with a ruler having different proportional scales. Among the many functions for which it was used, it was also able to measure the infinitesimal fractions of the angular degrees and to calculate the proportions between the lines, geometric shapes and solids, since it worked on the proportionality and commensurability of angles and segments.

In the 1584 Bruno wrote the *Mordentius* and the *De Mordentii circino* treatises, through which he exhibited the characteristics of the compass, highlighting not only the technical and the geometric instrument aspects, but also the application that he intended to do in theoretical and philosophical field. The extreme precision of the calculations performed by the new compass offered to Bruno objective data to scientifically validate his natural philosophy based on the atomist theory and on the idea of monad, supporting the thesis of the existence of the physical *minimum* as opposed to the aristotelian thesis of the infinite divisibility. Mordente rejected the metaphysical interpretation of his invention and Bruno, as reply, wrote two treaties: *Idiot triumphans* and *De Somnii interpretatione*.

To date, the literature has particularly deepened philosophical and historiographical aspects of the issue; starting from the critical studies at our disposal we will therefore investigate the mathematical and geometric aspects of the Bruno's thesis, in order to reconstruct the technical reasons of Giordano Bruno's philosophy of nature.

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Structural Analysis of Timber Trusses (1860–1940)

Emanuele Zamperini
Department of Civil Engineering and Architecture, University of Pavia, Italy
e–mail: emanzamp@yahoo.com

Abstract. The paper will show how modern structural engineering has been applied to a field of construction before ruled by empiricism and static intuition: timber trusses.

Since the late 18th century, the development of steel industry led to profound changes in the production and processing of building materials. This allowed the use of metallic members in substitution of timber ones and the development of trusses made entirely of steel.

Until mid–19th century timber trusses were designed on empirical basis, with redundant members and with static scheme difficult to be analyzed In absence of specific building traditions, the spread of metal trusses required the development of appropriate structural analysis methods; the theory of statically–determinate trusses was therefore elaborated However this theory couldn't be used with timber trusses because loads weren't applied in the joints, hypothesis required to ignore the static indeterminacy.

Since the 1860s many engineers expressed the need of structural assessment in traditional structures to optimize the use of materials. Structural analysis method for timber statically–indeterminate trusses were developed, considering struts as continuous beams on rigid supports. Not considering the deformation of the intermediate supports, such analysis didn't satisfy constitutive and strain–displacement equations and were gradually excluded from the structural mechanics manuals, but remained common in technical handbooks until 1940s.

In the 1870s, theoretical studies of Castigliano allowed the exact calculation of statically–indeterminate structures, technical papers were then published to apply this theory to various types of wooden trusses. The complexity of the calculations, however, relegated the use of these methods to sporadic examples; in most cases engineers still resorted to empiricism, simplified formulas, tables and nomograms.

In the early 20th century the production of new steel elements for timber connection (screws, bolts, spiked plates) allowed the experimentation of new timber trusses made mainly of boards; these trusses could reproduce the steel truss schemes due to the simplicity of the joints and to the slenderness of members, thus allowing the use of the theory of statically–determinate trusses.

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