XLVI National Congress of the Italian Society for the History of Physics and Astronomy

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Book of Abstracts

Edited by Mauro Gargano / INAF-Naples

SISFA
Società Italiana degli Storici della Fisica e dell'Astronomia

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National Institute for Astrophysics

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14 September

Inaugural Session of the Congress and Homage to Giuseppe Piazzi

Venue: *Sala dei Baroni at Castel Nuovo (Maschio Angioino)*

A special inaugural session is held to celebrate the bicentennial of the passing of Giuseppe Piazzi, who died in Naples on 22 July 1826. The ceremony honors the presence of city authorities and representatives from the key institutions supporting and endorsing the congress.

Institutional Welcomes & Opening Remarks

Opening addresses by local authorities and institutional representatives.

Historical Contextualization

Prof. Renata De Lorenzo (*President of the Società Napoletana di Storia Patria*) delivers a keynote address situating the astronomer Giuseppe Piazzi within the social and political landscape of late 18th- and early 19th-century Palermo and Naples.

Musical Performance

Ensemble Mercadante presents a short concert dedicated to the renowned astronomer of the Two Sicilies.

A petit buffet, catered by Le Lazzarelle, *is offered to all participants.*

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15 September

Congress opening

Venue: Astronomical Observatory of Capodimonte, Auditorium Ernesto Capocci

Valeria Zanini - *President of SISFA*
Pietro Schipani - *Director INAF - Astronomical Observatory of Capodimonte*

Keynote speech

Venue: Astronomical Observatory of Capodimonte, Auditorium Ernesto Capocci

Keynote speech: Revisiting the Long History of Quantum Theory

Authors: Jürgen Renn[1], Jochen Büttner[1]

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This paper presents results and methods from a collaborative international research project on the history of quantum physics. The project builds on decades of work on various aspects of the field's development, from its origins in the nineteenth century to the end of the twentieth. It aims at a synthesis of this century-long history, drawing on the research to dispel popular myths and give a wider public access to historical insights into how quantum physics developed. The project makes use of AI methods and demonstrates their potential for such a synthesis. To this end we developed QuHiRa (Quantum History Research Assistant), an AI assistant that opens up the project's corpus to historical inquiry.

Section

Physics and Physicists of the Twentieth Century in Naples

Venue: Astronomical Observatory of Capodimonte, Auditorium Ernesto Capocci

Correlation and Connectivity in Complex Systems

Authors: Antonio Coniglio[1]

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After a brief introduction to the origins of statistical physics in Naples, I will discuss the topics developed with the contributions of many researchers from the Neapolitan scientific community and international collaborations. Statistical physics describes systems with many degrees of freedom, whose interactions often give rise to complex emergent phenomena. Examples include phase transitions, as can be observed, for example, in the transition from a gaseous to a liquid state as the temperature decreases. These transitions are characterized by the presence of strong, large-scale correlations. The mechanism of this phenomenon can be traced back to a percolative model in which correlations are associated with the presence of geometric clusters. These clusters manifest themselves in the form of connected fractal structures. Beyond the interest in critical phenomena, the study of complex networks has recently received significant development in the social, biological, and technological fields, including the web, social networks, neural networks, and so on. In this conversation, I will discuss the role of correlation and connectivity in various complex systems.

Fifty Years of Naples at CERN, 1976-2016

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The INFN Unit of Naples and the Department of Physics of the Federico II University have been participating in CERN experiments since 1976, when the Neapolitan group joined the R209 collaboration at the Intersecting Storage Rings (ISR). Since then, this collaboration has continued uninterrupted for fifty years. During this period, the groups from Naples have taken part in the main CERN experiments, from the ISR to the LEP and the Large Hadron Collider (LHC), contributing to the design and construction of detectors, the development of electronics, software and computing infrastructures, and data analysis.

In addition to collider physics, Neapolitan groups have contributed to the development of neutrino physics, initiated in the early 1980s with the CHARM II experiment and continued with CHORUS and OPERA at the Gran Sasso National Laboratories, where tau-neutrino interactions produced by a CERN beam were directly observed for the first time.

The presentation retraces the evolution of these activities by following the growth of the groups and their participation in subsequent experiments, including ATLAS, CMS, NA62, SND@LHC and SHiP, up to research

and development activities in view of the Future Circular Collider (FCC). Some of the main scientific results to which the Neapolitan groups have contributed will also be recalled, including the discovery of the Higgs boson in 2012.

The Former Physics Pavilions of the Mostra d'Oltremare and the Roots of the Neapolitan Schools of Physics

Authors: Giovanni La Rana[1], Vincenzo De Luise[2]

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The former Physics Pavilions of the Mostra d'Oltremare in Naples represent an important chapter in the history of twentieth-century Italian physics. From the late 1950s onward, these buildings hosted the establishment of pioneering activities in theoretical and experimental physics that laid the foundations for the subsequent development of several fields of physics in the city.

After outlining the historical background of the Mostra d'Oltremare and its Physics Pavilions, this contribution focuses on the early development of physics research within them, reconstructing the scientific environment that emerged around the Advanced School in Theoretical and Nuclear Physics and the first experimental programmes carried out within the Physics Pavilions.

Today, although abandoned for more than two decades, the former Physics Pavilions remain a significant testimony to an important component of Naples' scientific and cultural heritage. Their preservation and enhancement are among the main goals of the Association All'Ombra del Cervo di Rodi APS, which promotes their recovery through the creation of a Centre of Excellence for research, technological innovation, and lifelong learning.

The Life and Science of Vittorio Silvestrini. His Legacy for Future Generations

Authors: Vincenzo Cioci[1,2], Pietro Cangiano[1], Camilla Palmieri[1], Laura Paribelli[1], Leonardo Pesci[1], Simone Salito[1], Luca Tia[1]

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This work presents Vittorio Silvestrini's noteworthy scientific achievements in the field of elementary particles and details his life, including the fundamental choices he made that have had such a significant impact on the relationship between science and society.

Vittorio Silvestrini left a profound mark on the history of Naples, primarily for having founded the *Città della Scienza* Science Center.

Professor Silvestrini has been committed to a form of science that is socially oriented, environmentally conscious, and open to dialogue with other dimensions of culture. He could be considered a role model for future generations.

In 1972, in Naples, he decided to devote his research to the development of solar energy as an alternative energy source, even though this meant having leave the research group that had been a constant part of his life up to that point. A similar choice was made when he decided to devote himself to science communication. Vittorio

Silvestrini was regarded by many as a visionary, one who challenged the limits imposed by the authorities and bureaucracy, and the prejudices against Southern Italy and Naples.
He was convinced that science should also open itself up to other areas of life, extending even to the inner dimension of the human being. In this regard, he cited research related to the anthropic principle: the idea that the values of the fundamental constants of the universe are not random, but appear to be "fine-tuned" in such a way as to make the existence of life and consciousness possible.

The Origins of Contemporary Artificial Intelligence between Statistical and Cybernetic Physics

Authors: Francesco Gagliardi[1]

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This contribution reviews the historical roots of contemporary Artificial Intelligence, highlighting its connection to both twentieth-century Statistical physics and Cybernetics.
In the 1920s, within the field of statistical physics, the well-known Ising–Lenz model was introduced. Over the course of the twentieth-century, it gained increasing relevance and also found applications in "non-traditional" areas of physics. In the 1980s, with the introduction of Hopfield networks and Boltzmann machines, the statistical connectionist approach progressively gained ground, replacing the logicist-symbolic paradigm typical of classical Artificial Intelligence, ultimately receiving recognition with the 2024 Nobel Prize.
Alongside this line of research, in the first half of the twentieth-century, Norbert Wiener (1894–1964) and others proposed, within the study of intelligent behavior, the new science of cybernetics: "the science of control and communication in the animal and the machine". In Italy, cybernetics found particularly fertile ground within the community of physicists as for example, the Neapolitan cybernetics school founded by Eduardo Caianiello (1921–1993), which in the 1960s hosted N. Wiener as a visiting scientist.
Many contemporary AI techniques, besides being connectionist, make use of concepts originally developed within cybernetics. Consider, for example, the links between Transformers (used in Large Language Models) and Information Theory, or between Convolutional Neural Networks and Signal Analysis.
In this light, contemporary AI, emerging around the beginning of the twenty-first century, is better understood as rooted in the statistical physics and cybernetics research originating in the first half of the twentieth century, rather than as evolution of symbolic-logic AI from the second half.

SISFA Prize 2026

Award ceremony of the Sisfa Prize, financed by the sustaining member Leonardo Gariboldi in memory of his parents.

Section

History of Physics in 20th Century

Venue: Astronomical Observatory of Capodimonte, Auditorium Ernesto Capocci

The special-relativistic theory of gravitation by Henri Poincaré and Alfred North Whitehead

Authors: Enrico Giannetto[1]

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Henri Poincaré, indeed, was the first (July 23, 1905) to propose a new mechanics based on the principle of special relativity and covariance by Lorentz transformations, and at the same time also a first relativistic theory of gravitation as a field, i.e. in terms of gravitational waves, formulated within a four-dimensional space-time. After the formulation of general relativity (1915), independently of Poincaré, Alfred North Whitehead formulated another special-relativistic theory of gravitation. The technical and conceptual details of these theories are discussed and comparisons are made with Albert Einstein's theory of general relativity. These theories have not only historical relevance, but also a possible theoretical importance to present a unique limit of the theory of general relativity. Indeed, general relativity is usually presented with a double limit: general relativity reduced locally in space-time to special relativity and its theory of gravitation had another limit in Isaac Newton's theory of gravitation. A special-relativistic theory of gravitation makes possible to consider special relativity as a theoretical construction, in terms of a unique epistemological principle of correspondence, constituting a unique limit to general relativity.

Between science outreach and political activism: Bari and its publishing houses in the second half of the twentieth century with a case study: Edizioni Dedalo

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Bari has always been home to a large number of publishing houses, reflecting its vibrant intellectual life. Covering a wide variety of topics, they have attested the intense periods our Nation has gone through (the post-war era, the economic boom, the political activism and the Years of Lead, the decline and the gradual erosion of ideologies, the Berlusconi era and so on). Among them, we wish to highlight the work of Edizioni Dedalo, which has focused its sixty-year-old asset and mission on political activism and, above all, on popular science, always considered as a tool for social awareness towards a more informed society. In this contribution, following a general overview touching on various publishing realities in Bari, we focused on the specific case of Edizioni Dedalo, emphasizing, among other things,the diversity of their catalogue and the importance of their archive. Together with their ownership of Sapere, the magazine that lead the way in popular science in Italy, with its ninety years old. And the trust they placed in the project of il Manifesto, otherwise rejected by major national publishing houses.

Beyond the Optical Sky: Serendipity, Exaptation, and the Violent Universe (1950-1970)

Authors: Stefano Furlan[1], Matteo Costa[2]

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Recent historiography has emphasized that the birth and flourishing of the new astronomies beyond the optical (X-ray, gamma-ray, and neutrino astronomy, alongside relativistic astrophysics), from the 1950s onward, did not merely add further "information" about already well-defined celestial objects. An "additive narrative" that assumes a smooth convergence of results across different bandwidths and observational communities is both historically inaccurate and conceptually untenable. Nonetheless, the conceptual changes and the remarkable challenges to match the results reached by different communities—specialized in the study of the sky with different channels/tools—are not the only features jumping to the eye in the first decades that defined the "violent universe", involving previously unimagined phenomena at energetic scales far beyond our terrestrial experience or our optical contemplation of the sky. Equally striking is the constitutive role of serendipitous discoveries of primary scientific importance, from the cosmic microwave background radiation to pulsars. Far from being mere accidents, these episodes can only be properly understood against the background of an early heuristic synthesis, which already in the 1950s oriented prepared individuals of remarkable versatility, and later on équipes of a new kind, toward recognizing the significance of unexpected signals detected through new technologies. Technologies and expertise emerging from defense research were systematically redirected toward astrophysical investigation, yielding crucial advances in the study of supernovae explosions and black holes. Taken together, serendipity and exaptation reveal the understanding of the violent universe not as a straightforward cumulative achievement, but as the outcome of a complex, contingency-laden, and socio-materially embedded scientific process.

The Ising Model: 100 Years of Connections Between Physics and Complexity

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Published in 1925, the Ising model represents a foundational milestone in statistical physics. Originally developed by Ernst Ising—under the guidance of his supervisor, Wilhelm Lenz—as a simplified mathematical framework to explain ferromagnetic ordering, the model has evolved into an indispensable tool for studying phase transitions and many-body systems.
Beyond its origins in physics, the Ising model is celebrated for its deceptive simplicity and profound interdisciplinary impact. It serves as a universal paradigm for analyzing order, disorder, and complexity, with applications extending into chemistry, biology, economics, and social sciences.
Ising 100: A Century of Ideas, Networks, and Transitions to celebrate.

Experimental confirmation of γ–γ scattering and implications of Quantum Field Coherence Theory, with the emergence of Giant Resonances in heavy-ion collisions.

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The recent experimental confirmation of γ–γ scattering in heavy-ion collisions, obtained in high-energy experiments, provides important confirmation of theoretical results previously developed by the author. In particular, this confirmation allows for the reevaluation of research published in Il Nuovo Cimento, based precisely on this interaction mechanism, subsequently extended to the lower energy regime (≈ 1 GeV per nucleon) and published in an international journal in the hadronic field.
In light of these results, the proposed contribution intends to present at the SIF Conference a confirmation of Quantum Field Coherence Theory (QFCT), already developed and formalized in previous monographs by the author. The effects of TQC in the context of heavy-ion collisions will be discussed, highlighting both their phenomenological implications and their theoretical implications for astrophysical physics. In fact, the QFCT (after applying General Relativity) is the only one that can explain the production of matter and antimatter (e+e- pairs) by some pulsars, such as Psr J2030+4415.
A possible theoretical interpretation of recent experimental evidence reported in the literature, attributable to quantum coherence phenomena on a collective scale, will also be proposed.
Finally, a confirmation of the quantum coherence theory postulated by Preparata and Glauber, originally expounded in their major books, will be presented, applied to the case of relativistic ion collisions. This approach, already implicitly anticipated in previous works by Baur and Bertulani, is here integrated into a coherent theoretical framework, with excitations of giant resonances, and compared with available experimental data.

From Small Experiments to "Battleship" Research: The Nobel Case of Emilio Segrè.

Authors: Bianca Buccilli[1]

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The Via Panisperna group is internationally recognized for its fundamental work carried out in Rome during the 1930s and for the leadership of its central figure, Enrico Fermi. Less well-known, however, is the scientific career of another member of the group: Emilio Segrè.
Following World War II, Segrè settled at the Berkeley laboratories where, together with Owen Chamberlain, he succeeded in identifying the antiproton. As is often the case, the awarding of the Nobel Prize conceals complex dynamics and background stories: what criteria guide the Committee's choices? In what way do these decisions reflect the state and the transformations of scientific research?
In this context, the Nobel Prize awarded to Segrè is situated squarely within a period of profound transition, marked by the shift from the physics of small-scale experiments to the new era of "Big Science", characterized by increasingly complex apparatuses that Segrè himself would define as "battleship experiments." This work aims to reconstruct this journey, highlighting the link between scientific recognition and the paradigm shift that transformed post-war physics.

Section

History of Astronomy and Physics

Venue: Astronomical Observatory of Capodimonte, Piazzi Hall

Copernicus in Padua: Portrait of Astronomer with Figures

Authors: Giangiacomo Gandolfi[1]

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This paper examines the historical and biographical implications of the identification of Copernicus's portrait within The Marriage of the Virgin, a sixteenth-century fresco at the Scoletta del Carmine in Padua attributed to Giulio Campagnola.
By evaluating facial feature analysis—including a defining scar mask—this study reconstructs the intricate social network of contemporary humanists, artists, and prognosticators surrounding Campagnola and Copernicus. It analyses the depicted cross-disciplinary community, which includes prominent figures like Albrecht Dürer, Giovanni Bellini, and Andrea Mantegna, alongside shared intellectual contacts such as Niccolò Leonico Tomeo, the Gaurico brothers, and astrologer Johannes Baptista Abiosus.

The confirmation of this bona fide portrait, executed around 1506, demonstrates that Copernicus was deeply integrated into Venetian and Paduan scholarly circles. His physical inclusion alongside high-status intellectual painters and architects reveals an early, real-time circulation of his embryonic ideas. Furthermore, it materializes his long-suspected relationship with Giorgione. This community was deeply engaged in theoretical astrological reforms following Pico della Mirandola's critiques and the highly anticipated planetary conjunctions of 1503–1504. This visual evidence independently corroborates Ludwik Birkenmajer's seminal thesis that the foundational nucleus of the Commentariolus was conceived during Copernicus's stay in Padua, a thesis reinforced by a recent stylistic analysis by Borski and Kokowski. Ultimately, the fresco captures the true Zeitgeist of a unique network of "Scientific Mathematical Humanism", where the intersection of liberal arts, philosophy, and precise sky measurement actively shaped the onset of the Modern Era.

The Debate on Cometary (Non-)Prognostication between Paolo Bravi and Livio Ignazio Conti (1664–1666)

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This paper aims to recover a neglected chapter in the long and complex history of the rejection of astrology as a legitimate form of knowledge. The appearance of the comets of 1664 and 1665 provided the occasion for significant epistemological debates concerning the validity of astrological prognostication, as exemplified by the largely overlooked controversy between the astrologer-physician Livio Ignazio Conti and the physician-natural philosopher Paolo Bravi regarding the alleged significance of these celestial phenomena. The debate began with the publication of Conti's Anatomia della Cometa (Venice, 1664), which defended the prognostic value traditionally attributed to comets. Bravi responded with his Anticometa (Venice, 1665), initiating a sustained exchange on the legitimacy of cometary predictions. A second round of printed replies followed: Conti published the Anatomia dell'Anticometa (Venice, 1665), to which Bravi answered with the Antilogia Astrologica (Venice, 1666), whose second part was issued separately under the title La Cometa decomata. The Bravi–Conti exchange displays several distinctive features that merit close investigation. Most of the works involved in this neglected debate survive in only a single known copy, while some have not yet been digitized and remain difficult to access. Consequently, neither the individual texts nor the controversy as a whole have ever been studied comprehensively. This paper proposes the first systematic examination of the entire exchange, treating its constituent works as interconnected contributions to a single intellectual and epistemological debate.

Luca Pellicciari: from Natural Philosophy to Experimental Physics, the Experimental Physics Theatre at the University of Perugia

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Luca Antonio Pellicciari, a priest and physicist, is an almost unknown figure in the history of Italian physics in the late eighteenth century. His significance lies in two aspects: he was the first professor of experimental physics at the University of Perugia and he was responsible for the establishment of the university's theatre of experimental physics. This facility constituted the foundational core of the experimental physics cabinet, whose instruments (augmented through subsequent acquisitions) are now preserved in the Department of Physics. At the University of Perugia, physics began to emerge as an autonomous discipline only from 1730 onward, no longer embedded within other fields of teaching, although it still retained a predominantly theoretical character closely aligned with natural philosophy. After 1753, the Bishop of Perugia, as Rector and in agreement with Pope Clement XIII, resolved to give the discipline an experimental orientation by establishing a chair of experimental physics, to which Pellicciari was appointed. For this purpose, Pellicciari was sent to Rome and tasked with creating in Perugia a physics cabinet modelled on that of the Sapienza University. This initiative reflected broader developments occurring in major Italian universities during the second half of the eighteenth century. Rather than merely constructing a laboratory, the project involved the creation of a true theatre of experimental physics, designed for public demonstrations addressed not only to students. The main aspects of Pellicciari's biography have been reconstructed, with particular attention to his research interests and to the establishment of the theatre of experimental physics.

Geodesy and Earth sciences over a long 19th century

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Before the First World War, geodesy was not the same mathematical and technical discipline we understand it to be today. It was instead conceived as a collection of knowledge and practical skills (acquired during exploration travels), which historians generally refer to as the ''observatory sciences''. Drawing on the meeting accounts of the Italian geodetic commission, the aim of this talk is to focus on specific examples to explain, in particular, the connections between geodesy and what we now call the Earth sciences (seismology, geological hypotheses, meteorology, latitude and longitude data, etc.), spanning a long 19th century.

Scientific Heritage and Digital Humanities: the Polo Documentario Storico Italiano della Sismologia e Meteorologia Project

Authors: Maria Giovanna Bianchi[1], Cecilia Ciuccarelli[1], Graziano Ferrari[1], Monia Maresci[1], Gabriele Tarabusi[1]

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We presents the aims, methodology, and first outcomes of the Polo Documentario Storico Italiano della Sismologia e Meteorologia (PoloDoc), a digital humanities and history-of-science project promoted by Istituto Nazionale di Geofisica e Vulcanologia in collaboration with Museo Galileo and other important archival and scientific institutions. The project is devoted to the preservation, digital reproduction, cataloguing, and historical interpretation of documentary and instrumental sources related to the development of Italian seismology and meteorology between the nineteenth and twentieth centuries.

PoloDoc aims not only to safeguard fragile scientific heritage, but also to reconstruct the networks of observatories, scientists, institutions, and practices that contributed to the emergence of meteorology and earthquake science in modern Italy. Through the integration of archival documents, photographs, scientific instruments, correspondence, technical reports, and historical datasets, the project creates an interdisciplinary research infrastructure that connects the history of science with contemporary historical seismology, geophysical research and risk awareness. Particular attention is devoted to the role of scientific institutions established after more destructive earthquakes, including the gradual formation of a national seismic service and the circulation of observational practices across local observatories and international scientific networks. The project also highlights the importance of collaboration between historians of science, archivists, geophysicists in producing new forms of digital access to scientific heritage.

By combining archival research, digital technologies, and historical analysis, PoloDoc contributes to current debates on the preservation and public communication of scientific heritage, while offering new perspectives on the historical relationship between science, natural disasters, and society in Italy.

An Astronomer in the Himalayas: Maps, Charts, and Scientific Instruments on the Roof of the World: a Project to Preserve and Promote Archival Collections

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The Expedition to the Himalayas, Karakoram, and Chinese Turkestan led by Filippo De Filippi is considered the greatest scientific expedition of the early 20th century in the world's highest mountains. Departing from Italy in 1913 and returning at the end of December 1914, it pursued numerous scientific objectives, from the study of gravity and magnetism in the highlands of Central Asia to research on solar radiation. One of the expedition's participants was the astronomer Giorgio Abetti, who would later become Director of the Arcetri Astrophysical Observatory (1921-1952).

The proposed contribution will introduce the ongoing project Un astronomo sull'Himalaya: carte mappe strumenti

scientifici sul tetto del mondo with a particular focus on the study, cataloguing, and digitization of archival materials held at the Arcetri Astrophysical Observatory.
These materials will be presented through the creation of a virtual exhibition, enabling visitors to follow the expedition's itinerary through the successive stages of its journey highlighting its key figures and scientific activities, particularly those related to astronomy.
Furthermore, all the material, properly digitized and enriched with metadata, will be made available for consultation through "Polvere di Stelle, the astronomical cultural heritage portal of INAF".

Visit to the MuSA

The visit includes access to the MuSA (Museo degli Strumenti Astronomici) at the Astronomical Observatory of Capodimonte, showcasing its extraordinary collection of historical telescopes, antique instruments, and its rare books collection.

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16 September

Section

Museums and Scientific Collections of Physics and Astronomy in Italy and Worldwide

Venue: Astronomical Observatory of Capodimonte, Auditorium Ernesto Capocci

Keeping Precise Time: The Charles Frodsham Regulators in Italian Observatories

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The need for more accurate astronomical data for geodesy, the timing of celestial events, land surveys, determining longitude for navigation, and to regulate other timepieces led to the development of very accurate clocks in the 1860s and 1870s.

This presentation will focus on the astronomical clocks that the London horological company Charles Frodsham, which specialised in high-precision timepieces, made for several observatories around the world during that period. The company's regulators were considered to be among the finest and most precise scientific instruments available on the market.

In particular, the talk will analyse the regulators supplied to the observatories in Palermo, Padua and Naples. It will then discuss their construction and technicalities, and consider what they reveal about the use of precise timekeeping in mid-19th-century observatories.

Brass, Glass, and Measurement: Carlo Dell'Acqua and the Making of an Italian Manufactory for Precision Scientific Instruments, 1828–1870

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This paper offers the first systematic reconstruction of Carlo Dell'Acqua's career and examines the gradual making of an Italian manufactory for precision scientific instruments. Dell'Acqua was a Milanese instrument maker whose activity can be traced through an unusually rich corpus of evidence: unpublished manuscripts from the archive of the present-day Liceo Beccaria, formerly the Liceo di S. Alessandro in Milan; five catalogues issued between 1847 and 1863; and signed instruments preserved mainly in northern Italian collections. Moving beyond the traditional invisibility of instrument makers in the history of science, the paper follows the material and institutional settings in which he operated: workshop, physics cabinet, observatory, printed catalogue and post-Unification manufactory. Beginning with the gold-medal artists' mannequins produced with Stefano Ceruti in 1828, it traces Dell'Acqua's transition to scientific instrument making: Angelo Bellani's caloric collector in 1836, his documented passage from provisional to permanent mechanic of the S. Alessandro physics cabinet between 1837 and 1839, his electro-magnetic induction apparatus c. 1840, and his pneumatic, meteorological and electro-medical apparatus. Special attention is given to the catalogues as evidence of the expansion of his workshop into a repertory for physics, chemistry, geodesy, meteorology, telegraphy and teaching. The final section examines the Tecnomasio Italiano, co-founded in 1864 by Dell'Acqua, Luigi Longoni and Alessandro Duroni in response to the perceived weakness of Italian precision manufacture. The paper argues that an instrument maker could become an indispensable, yet often overlooked, agent of experimental culture, turning local and regional scientific needs into durable, reproducible and marketable apparatus.

From Moonlight to Lighthouse Beams: Fresnel Lenses between Science and Technology in the Bourbon Kingdom

Authors: Rosanna Del Monte[1], Azzurra Auteri[1]

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Throughout the nineteenth century, Fresnel lenses represented one of the most significant innovations in applied optics, with applications ranging from experimental research to maritime navigation. This paper traces the invention, development, and circulation of these devices, beginning with the work of Augustin-Jean Fresnel and focusing in particular on the large lens employed by Macedonio Melloni in his investigations into the thermal effects of moonlight. These experiments contributed to contemporary debates on the nature of radiant heat and on the relationship between luminous and thermal radiation. By examining both laboratory and navigational applications, the paper highlights the multiple trajectories through which Fresnel lenses shaped nineteenth-century scientific and technological uses of light.

This study also examines the diffusion of Fresnel lenses within the lighthouse network of the Kingdom of the Two Sicilies, highlighting the interactions between physical research, technological innovation, and nineteenth-century Bourbon modernization efforts. Drawing on archival sources, surviving scientific instruments, and technical

documentation, the study emphasizes the role of Neapolitan scientific culture in the circulation of optical knowledge and technologies within the broader international scientific and technological landscape.

The Astrolabes of the Museum of the Certosa di San Martino in Naples

Authors: Ornella Marra[1], Giancarlo Truffa[2]

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The naval section of the Museum of San Martino in Naples preserves a small yet significant collection of ancient astrolabes that, prior to the Second World War, were housed in the former National Museum of Palermo. The group consists of an universal astrolabe or Arab ṣafiḥa, an astrolabe bearing inscriptions in both Arabic and Latin, two Latin astrolabes, and a nautical astrolabe.

Thanks to the indispensable collaboration of the Museum's administration, it has recently been possible to carry out detailed measurements and high-resolution photography of these instruments. The results of this new study will be presented.

The origins of the facsimile, a history of fixed-image transmission

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This study explores the forgotten history of still and documentary image transmission, focusing on the evolution of the facsimile. The research started with the discovery of equipment from the early decades of the 20th century, which revealed the importance of this pioneering technology, now part of the collections of the MUMEC Museo dei Mezzi di Comunicazione in Arezzo.

The roots of this innovation go back to Giovanni Caselli's Pantelgraph, patented between 1855 and 1860, capable of sending and receiving images via an electro-chemical telegraphic system. The decisive step came in 1904 with the invention of the Belinograph by French engineer Edouard Belin. This device used a photocell to convert images into electrical signals, transmitting them through existing telegraph and telephone networks. Belin also created a receiver that decoded these signals, reconstructing the image on chemically treated photographic paper.

In 1914, Belin extended his invention to radio telegraphic (wireless) transmissions, anticipating the era of wireless communication of a still image. The Belinographic system, also known as 'telephotography', was fundamental to journalism, enabling the rapid dissemination of photographs around the world. This technology laid the foundations for the modern fax machine, photocopiers and scanners, revolutionising the transmission of documents and visual information well before the digital age. The research explores the impact of this system on society and analyses its use and historical persistence in Italy between the 1920s and 1930s, the period of maximum success for Belin's technology.

The Historical and Educational Pathway of the Museum of Electrical Technology in Pavia

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In the spring of 2027, the Museum of Electrical Technology in Pavia will celebrate its 20th anniversary. Its collection, originating from the University of Pavia and from donations by Italian companies such as Enel, Sirti, Eni, and others, spans the history of electricity from electrostatics to electronics, from the Leyden jar to personal computers, through a wide range of electrical instruments, motors, machines and other devices.
The Museum serves a dual purpose. On the one hand, it fulfills the traditional role of preserving historical artifacts, typical of classical history museums; on the other hand, it offers visitors the opportunity to observe and understand the operation of many of these objects, as is common in science museums.
The Museum's combined historical and scientific approach makes it particularly well suited for educational visits by secondary school and university students, while also providing interactive activities for younger audiences.
The exhibition is arranged chronologically and divided into five sections, within which a coherent and comprehensive historical and educational pathway can be identified. The pathway is modular so it can be experienced also in single, self-contained sections.
This presentation aims to introduce that pathway by providing a theoretical framework, discussing the technical challenges that emerged over time, and illustrating the solutions adopted for their practical implementation. The presentation aims to highlight the Museum's potential, already established in the fields of electrical engineering and the history of technology, in the field of the history of physics as well.

L'emisfero celeste di Eufrosino Della Volpaia (1530)

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Le prime carte celesti a stampa furono realizzate da Albrecht Durer e stampate nel 1515 a Norimberga. Frutto della tradizione manoscritta sviluppatasi tra la Baviera e l'Austria nel XV secolo, ebbero un fortissimo influsso per la successiva evoluzione della cartografia celeste. Nel 1530 fu stampata a Venezia da Eufrosino Della Volpaia una mappa dall'emisfero meridionale chiaramente derivata da quella disegnata da Albrecht Durer. Avendo potuto studiare l'unica copia esistente, verranno presentate le specifiche caratteristiche e situata nella tradizione cartografica del XVI secolo.

Section

History of Astronomy and Physics

Venue: Astronomical Observatory of Capodimonte, Piazzi Hall

The Former S-RPIF Archive at INAF/IAPS: Preserving the Historical and Cartographic Legacy of Early Planetary Exploration

Authors: Alessandro Frigeri[1], Federico Di Giacomo[1], Antonella Gasperini[1], Roberto Della Ceca[1], Filippo Giacomo Carrozzo[1], Federica Duras[1], Maria Farina[1], Giulia Mantovani[1]

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Planetary exploration began well before the global dissemination of the digital infrastructures that characterize today's scientific landscape. During the 1960s and 1970s, mission data processing was confined to a few specialized institutions, making the distribution of scientific results dependent on the physical shipping of analog materials. To institutionalize access, NASA established in 1977 the Regional Planetary Imaging Facilities (RPIF) network. In the mid-1980s, the network expanded to Europe, including the Southern-Europe RPIF (S-RPIF) in Rome, hosted at the CNR's Reparto di Planetologia, later integrated into the National Institute for Astrophysics (INAF) and currently housed within the "Fototeca Coradini" at IAPS institute in Rome.

From the perspective of the history of astronomy, the RPIF Archive represents a documentary heritage of exceptional value, connecting modern space science with the historical material preserved in Italian observatories. The collection preserves crucial milestones of space cartography, including hundreds of lunar maps from the Apollo programs, Martian topographic quadrangles featuring original IAU nomenclature, iconographic data from Mariner and Viking missions, and Soviet documentation dating back to the 1960s. A crucial set is represented by the originals of the telescopic atlases of the Moon where the first orbital and landed robotic missions have been planned.

The archive operates as a living laboratory where the past engages with the future of planetary science. Despite the cessation of official NASA support in 2020, ongoing recovery efforts at IAPS highlight the urgency of preserving these tangible witnesses, testifying to the enduring presence of Italian scientific research on the international stage.

A carefully considered choice

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The reason behind the use of paraffin (hydrogenated substances) to slow down neutrons in the famous experiment carried out in Via Panisperna on 22 October 1934 is recalled, including by several members of the Roman research group, as a sudden insight on Fermi's part. An analysis of much of the extensive literature relating to the period 1930–34 on topics such as α and β decay, the discovery of the neutron, and artificial radioactivity; a review of the proceedings of the 1933 Solvay Congress and the 1934 International Congress of Physics in London; consultation of the Amaldi Archive and other archives on the history of science, lead me to hypothesise a different interpretation, one even more relevant to the way science proceeds, in which the general social environment, combined with the state of research on the specific topic, emerge as indispensable steps in the process of the growth and improvement of knowledge. The picture emerging from this case study opens up the possibility of an interpretation in which the successful and innovative idea that emerged in Rome takes on a different connotation, appearing as a product of the overall context of the era. At the same time, it confirms the decisive approach adopted at the institute in Via Panisperna, which also involved numerous visits to other laboratories and constant consultation of articles from the period.

The Twentieth-Century Modernisation of the Bologna Observatory

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By the late nineteenth century, the Bologna Observatory, housed in the seventeenth-century Specola Tower, had entered a period of decline due to structural constraints and the increasing effects of light pollution. A decisive turning point came in 1936, when the Observatory was transferred to Loiano under the direction of Guido Horn d'Arturo (1879-1967), who equipped the new site with a 60-cm reflector featuring a monolithic mirror manufactured by the Zeiss workshops in Jena, marking Bologna's return to the forefront of Italian astronomy.

Horn d'Arturo's institutional and cultural contributions extended well beyond this: he founded Coelum (1931), the first Italian journal devoted exclusively to the popularisation of astronomy; he reorganised the Observatory library; and he carried out the first systematic reordering of the Historical Archives of the Department of Astronomy of the University of Bologna.

His scientific work ranged from positional astronomy and variable stars to optical phenomena and the physiology of vision. He is best known for developing the tessellated mirror, a technology now employed in major astrophysical facilities. Despite his prolific output, however, he published almost exclusively in Italian, a circumstance that contributed to the limited international reception of his work.

Drawing on published sources, previously unexplored archival materials, and surviving instruments preserved at the Specola Museum of Astronomy, this paper explores Horn d'Arturo's role in a crucial moment for the scientific and institutional development of Bologna astronomy. The contribution is presented on the occasion of the ninetieth anniversary of the Loiano Observatory and the tricentenary of the Specola.

Section

The Historical and Scientific Legacy of Giuseppe Piazzi

Venue: Astronomical Observatory of Capodimonte, Auditorium Ernesto Capocci

Giuseppe Piazzi: a brief biographical and scientific profile (provisional title)

Authors: Ileana Chinnici[1]

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A Theatine priest and astronomer, Giuseppe Piazzi (1746–1826) is a figure who deserves renewed attention on the occasion of the bicentenary of his death. His contributions to the advancement of astronomy, both in terms of knowledge and infrastructure, are mainly related to his unexpected discovery of Ceres (the first asteroid, now classified as a dwarf planet) and his crucial role in founding the observatories in Palermo and Naples (Capodimonte) at the request of the Bourbon government. In fact, Piazzi's profile is that of a man in the service of the State, deeply committed to the Enlightenment ideals of the intellectual Masonic circles of the Bourbon court. Bourbon reformism is considered one of the most interesting examples of enlightened despotism in Italy, marked by the active participation of Enlightenment intellectuals; Piazzi was firmly among their ranks. His two-year sojourn in France and England granted him firsthand experience with the cutting-edge ideas and projects circulating in Europe. Despite being a man of the establishment, he shared in the efforts to transform the Kingdom of Sicily—later the Kingdom of the Two Sicilies—into a modern state, competing with the leading European countries.

The Memory of Giuseppe Piazzi: Astronomer, Scientist, and Academic between Sicily and Naples

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The presentation recalls Giuseppe Piazzi, beginning with his life and educational background, and then examining his astronomical research in Palermo, where he produced highly valuable star catalogues and earned recognition at the European level. His role in Naples is then explored, both as an astronomer and as the visionary behind the Capodimonte Observatory, as well as President of the Royal Academy of Sciences, which later became today's National Society of Sciences, Letters and Arts in Naples.
Finally, the scientific legacy left by Piazzi is discussed.

From Foundation to First Light (1791-1819): Giuseppe Piazzi and the Making of the Naples Observatory

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Between 1791 and 1819, the foundation of the Naples Observatory unfolded through a sequence of political and dynastic ruptures that shaped its timing, form, and purpose. From the initial project promoted by Ferdinand IV, to the provisional seat at San Gaudioso under Joseph Bonaparte, and finally to Murat's 1812 decree that launched the construction of the Capodimonte Specola, the institution remained suspended for decades between scientific ambitions and the instability of power.

This contribution reconstructs that trajectory by highlighting the decisive role played by Giuseppe Piazzi, summoned to Naples in 1817 by Ferdinand I to rationalize the original plan and bring the building to completion. Drawing on his international prestige, Piazzi reactivated the construction works, defined an advanced instrumental layout, and identified Carlo Brioschi as the key figure for the Observatory's future scientific direction. The paper shows how the authority and pragmatism of the Valtellinese astronomer transformed a long history of decrees and interruptions into the operational reality that led to the "first light" of 17 December 1819.

A study of 19th-Century Stellar Catalogues to improvement of modern astrometric data

Authors: Federico Di Giacomo[1], Simone Zaggia[1], Valeria Zanini[1]

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Astrometry is a branch of astronomy that involves precise measurements of the positions and movements of stars and other celestial bodies. Modern astrometry has been entirely revolutionized by the ESA space missions Hipparcos and Gaia. With its last release, DR3, and the next December 2026 DR4, Gaia allowed milli-arcsec (mas) precision on the positions, parallaxes and proper motions of about 2 billion stars down to a faint limiting magnitude of 20. However, Gaia suffers from severe detector saturation for the brightest sources ($G < 5$), strongly limiting the astrometric precision of these sources.

A possible way to overcome this problem is based on the analysis of historical astrometric catalogues with a long-term baseline (>150 years). Building upon a methodology successfully developed for Santini's Paduan Catalogues, we demonstrate how this cross-matching and re-reduction procedure can be systematically extended to Giuseppe Piazzi's pioneering stellar Catalogues and other nineteenth-century meridian circles observations (i.e. Bessel, Argelander, etc.).

This integrated pipeline directly incorporates these historical stellar positions within a unified, common astrometric framework alongside Hipparcos and Gaia data, after carefully modeling and mitigating the intrinsic instrumental biases and systematic errors of early meridian circles. By executing a continuous, multi-epoch linear regression across this extended secular baseline, we derive highly robust proper motion components. The direct comparison between these secular kinematic tracks and modern space measurements naturally reveals subtle proper motion

anomalies, long-period orbital curvatures, or unexpected kinematic variations. This approach effectively transforms legacy catalogues into active scientific assets capable of capturing complex, long-term stellar dynamics.

Giovanni Virginio Schiaparelli (1835–1910): An Astronomer despite Himself?

Authors: Pasquale Tucci[1]

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From a young age, GVS' parents had instilled in him a love for astronomy. He enrolled in the degree program in Hydraulic Engineering and Civil Architecture, in the absence of that one in Mathematics. Giovanni Plana, then director of the Obsevatory of Turin, taught Calculus. However, GVS was unable to establish a productive relationship with him. Thanks to the support of some of his professors, he was able to study for two years in Berlin under Encke's supervision. He then spent almost another year at Pulkovo under the supervision of Struve father and son. Once he became director, in 1862, he realized that the glorious Observatory of Boscovich and Oriani had many critical issues:

1. The instruments were obsolete.
2. The staff was small, poorly paid, not prepared to the task, and had unfounded career ambitions.
3. The instruments were placed on top of a bell tower.
4. In post-Unification Italy there were eleven astronomical observatories that were undersized both in terms of instrumentation and personnel.

GVS knew that a good observatory should feature at least two types of instruments: one for meridian observations and one for extra-meridian observations.
GVS managed to obtain two telescopes that at the time were considered among the best. But as far as the other three points were concerned, GVS obtained little or nothing.
For this reason, he devoted part of his time to activities that were considered marginal.
In my talk, I will take into consideration the contributions that GVS managed to provide.

Celebrating the Astronomer Giovanni Battista Donati on the Bicentenary of His Birth

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A commemorative event will be held in Pisa on 16 December 2026 to mark the bicentenary of Giovanni Battista Donati, one of the most prominent Italian astronomers of the 19th century. The celebration will retrace the main professional achievements of the scientist, obtained in just 20 years of activity (from 1852 until his premature death in 1873). Donati was a pioneer in the application of spectroscopy to astronomy (the emerging astrophysics), creating the first classification of stellar spectra and being the first to observe the spectrum of a comet; he discovered 5 comets, including C/1858 L1, one of the most spectacular astronomical events of the 19th century; observing several auroras, he proposed the establishment of a new discipline dedicated to the study of the influence of solar activity on our planet, cosmic meteorology (a forerunner of modern space weather); he founded and held the scientific direction of what later became the Officine Galileo, a company of worldwide significance and renown; finally, he participated in the reorganization of astronomical studies in the Kingdom of Italy, designing and founding a new and modern institution, the Arcetri Observatory in Florence.

Section

Dialogue Between History, Education, and Public Outreach in Physics and Astronomy

Venue: Astronomical Observatory of Capodimonte, Piazzi Hall

Poche lettere, indiritte ad una Dama filosofante. Giuseppe Corigliano's Philosophical Letters, plurality of worlds and popular astronomy in eighteenth-century Naples

Authors: Lorenzo De Piccoli[1,2]

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I set out to discuss a work of popular astronomy titled *Philosophical Letters, in which the weakness of the arguments so far proposed in favour of plurality of worlds is demonstrated* (Venice, 1765), by Apulian physician and natural philosopher Giuseppe Corigliano, and the context in which they were written. So far, this work has received little scholarly attention. The *Letters* are an example of the many works dealing with the extraterrestrial life controversy published in Italy in the latter half of the 18th-century, and a product of the lively scientific and erudite culture which had developed in Naples at the time. Intellectuals in Naples had played, in the decades prior, an important role in the introduction of Cartesian and later Newtonian ideas in Italy, including one specific controversy which was tied to these new forms of natural philosophy: plurality of worlds, or the extraterrestrial life debate. In writing,

Corigliano demonstrates his knowledge of popular works dealing with the topic, such as Huygens' *Cosmotheoros* (1698), and develops original arguments against them. Furthermore, a study of the Lettere is a way to shed some light on Petronilla de Lignéville (1733-1793), a noblewoman to whom the *Letters* are addressed and dedicated. De Lignéville played a significant role in the cultural life of Naples as a patron of scholars, natural philosophers and literates. From Corigliano's *Letters*, a profile emerges of a true "Dama filosofante", one of those women who gave an important contribution to enliven the intellectual landscape of 18th-century Italy.

The Physics Instrument Collection of the Liceo Classico Parini in Milan during Giuseppe Belli's Teaching Years (1820–1840)

Authors: Renzo Traversini[1]

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Before his appointment at the University of Pavia, Giuseppe Belli (1791–1860) served as Professor of Physics at the Imperial Royal Lyceum of Porta Nuova in Milan — today the Liceo Classico Parini — between 1820 and 1840. Alongside his teaching duties, he was responsible for the management and development of the school's collection of physics instruments.

A large body of handwritten notes preserved at the University Library of Pavia documents Belli's systematic work on the acquisition, maintenance, and improvement of the collection, as well as his supervision of technical activities. The study of these sources is still ongoing and is enabling the reconstruction of the evolution of the physics cabinet and its role in teaching practices during the first half of the nineteenth century. The documents also shed light on Belli's experimental research, conducted alongside his educational activities.

A Quarter Century of the SISMOS Project: Recovery and Enhancement of Historical Seismographic Data

Authors: Monia Maresci[1], Graziano Ferrari[2], Sandro Franceschelli[2], Emanuele Frocione[2], Alessio Mautone[2]

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Established in the early 2000s at the Istituto Nazionale di Geofisica e Vulcanologia (INGV), the SISMOS Project represents one of the most significant Italian initiatives devoted to the recovery, preservation, and enhancement of the nation's historical scientific heritage, including instruments, seismograms, documents, and archives at risk of loss or deterioration.

Over the past twenty-five years, SISMOS has carried out extensive activities in research, cataloguing, restoration, and digital reproduction of national and international seismological heritage. Among its major achievements are the recovery and restoration of more than thirty historical instruments, the preservation of documentary collections, and the high-resolution digital scanning of over 200,000 historical seismograms recorded between the late nineteenth and twentieth centuries and recorded in approximately 200 Italian and European observatories.

In parallel, the project has contributed to the development of an information system and a dedicated website

providing open access to these data and related information for the international scientific community. This effort has fostered the growth of an international seismological sub-community specialising in the use of historical seismic recordings for the study of major earthquakes that occurred between the late nineteenth century and the mid-twentieth century.
SISMOS has also promoted numerous exhibitions, conferences, and public outreach initiatives, contributing to the dissemination of scientific culture and seismic risk awareness. Today, SISMOS represents a reference framework for the integration of historical observations with modern digital infrastructures and for the study and scientific exploitation of historical seismographic data.

SISFA General Assembly

Venue: Astronomical Observatory of Capodimonte, Auditorium Ernesto Capocci

Annual meeting of the members of the Italian Society for the History of Physics and Astronomy.

17 September

Section

History of Physics in 20th Century

Venue: Museum of Physics of Naples, Great Hall

A Schrödinger equation without Schrödinger?

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It is easy to see that the Schrödinger equation was implicitly contained in earlier work by other theorists: first, in a remark by Louis de Broglie in his dissertation of November 1924, and second, in the new quantum mechanics proposed by Werner Heisenberg in July 1925. Yet the equation first appeared in a famous article sent to Annalen der Physik by Erwin Schrödinger in late January 1926. We will investigate why the equation was not obtained before Schrödinger and assess how this may have influenced the subsequent development of quantum theory.

Italian Competitions for Physics Chairs from 1902 to 1942

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The evolution of Italian physics in the first half of the 20th century is observed through a detailed quantitative and qualitative analysis of university competitions for chairs in experimental, theoretical, terrestrial, and technical physics, based on the texts of the judging committees' reports. One can clearly see the scientific and sociological dynamics of the slow transition from the stale nineteenth-century tradition to the more modern and advanced vision that characterized Italian physics in the second half of the 20th century.

From Via Panisperna to Como: Fermi, Persico, Pontremoli and the International Congress of Physicists (1927)

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Within the framework of the CREF project *In the Footsteps of the Via Panisperna Boys*, we reconstruct the relationships between Enrico Fermi, Enrico Persico and Aldo Pontremoli during the 1920s at the Institute of Physics of the University of Rome. Drawing on previously unavailable archival sources, we examine the scientific, institutional and personal dynamics that shaped their interactions, showing how cooperation and competition coexisted in the formative years of modern theoretical physics in Italy.

Particular attention is devoted to the International Congress of Physicists held in Como in September 1927, one of the most significant scientific events organized in Italy during the interwar period. The congress, whose Secretary General was Aldo Pontremoli, provides a privileged vantage point from which to analyse the roles played by the three physicists within both national and international scientific networks. By situating their participation in the broader context of the transformation of Italian physics after the First World War, we highlight how the congress represented the culmination of a process that had also involved the establishment of the first Italian chair in theoretical physics.

The Como meeting thus emerges not only as a landmark event in the international circulation of physics, but also as the final stage of a remarkable convergence among Fermi, Persico and Pontremoli, interrupted only a few months later by Pontremoli's tragic death during the Arctic expedition of the airship *Italia*.

The Path to the Neutron: From Rutherford's Hypothesis to Chadwick's Discovery

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The discovery of the neutron in 1932 represents a watershed moment in the history of modern physics, fundamentally altering our understanding of the atomic nucleus and the forces of nature. This contribution explores the historical evolution of the neutron concept, beginning with Ernest Rutherford's 1920 Bakerian Lecture, where he first hypothesized a "neutral doublet" to resolve discrepancies in atomic mass and nuclear charge.

The analysis traces the experimental challenges of the 1920s and early 1930s, focusing on the pivotal roles played by Bothe and Becker's "beryllium radiation" and the subsequent interpretations by Irène and Frédéric Joliot-Curie. While the Joliot-Curies observed the projection of protons from paraffin wax, they initially misidentified the radiation as high-energy gamma rays. It was James Chadwick's rigorous experimentation and conservation-based reasoning at the Cavendish Laboratory that finally identified the particle as having a mass similar to the proton but no electric charge.

By examining primary sources and contemporary scientific debates, this contribution highlights the transition from a "proton-electron" nuclear model to the "proton-neutron" paradigm. This shift not only solved the "nitrogen

anomaly" but also paved the way for the development of nuclear energy and the rise of "Big Science" in the mid-20th century.

The hydrodynamic electromagnetism of the Norwegian Bjerknes family – A neglected but revaluable research program

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In the late nineteenth and early twentieth centuries, the theoretical and experimental research of Norwegian physicists Carl Bjerknes (1825-1903) and his son Vilhelm (1858-1951) on a fluid-dynamic mechanism for electromagnetic interactions was well-known and discussed in Europe. The Bjerknes, convinced that hydrodynamic sink and source entities could not exist in nature, as were all the scientists involved in the creation of field physics, they resolved to model the interactions between objects with central fields using pulsations of elastic hollow spheres immersed in a liquid. Along with his theoretical studies and predictions, Carl Bjerknes, with the assistance of his son Vilhelm, designed experimental setups that confirmed the predicted effects. Two rubber spheres immersed in water and connected by tubes to hydraulic pumps attracted each other if vibrated in phase, and repelled each other if vibrated in opposition of phase. The forces at play are opposite to electromagnetic forces, where two electrons repel each other and an electron is attracted to a proton. The Norwegians' demonstration devices were displayed, attracting great interest and prizes, at various scientific exhibitions of the time. Vilhelm Bjerknes, before becoming a leading figure in modern meteorology, worked tirelessly, through theoretical writings and family history, to preserve the memory of this branch of field physics research at a time when relativistic and quantum theories were gaining widespread attention from the scientific community. Generalizations of these experiments, and a reevaluation of a forgotten experiment by Robinson in 1881, could give new clues to the true nature of light.

Feynman-Wheeler absorber theory and cosmology

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Richard Feynman and John Wheeler's joint contributions on radiation reaction and absorber theory, based on the action at a distance picture, are historically retraced and contextualized. Then we focus on the cosmological consequences of absorber theory, as emerged from the talks and discussions which took place at the conference on "The Nature of Time", held at Cornell University in June 1963 and organized by Thomas Gold and Hermann Bondi. The emphasis is on the reinterpretation of absorber theory by Jack Hogarth, Fred Hoyle and Jayant Narlikar as a theoretical criterion for evaluating the global structure of the universe, in a period dominated by the broader cosmological controversy between steady-state models and evolutionary Big-Bang scenarios.

Einstein's KosmoLogik (1917)

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The perfectly cylindrical universe - without expansion or contraction - proposed by Einstein in 1917 indeed involves, as has often been pointed out, a surprising balance between the repulsive influence represented by the cosmological constant and the gravitational attraction due to matter. I propose a (kosmo)logical analysis of "Kosmologische Betrachtungen zur allgemeinen Relativitätstheorie" : Einstein uses the cosmological constant to eliminate - by changing the topology of the universe - the spatial infinities which gave rise to various troubling contradictions.

Section

Museums and Scientific Collections of Physics and Astronomy in Italy and World-wide

Venue: Museum of Physics, New Hall

Clement Ader's Théâtrophone: a technological marvel.

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The invention of the telephone, attributed to Bell in 1876, with the ability to transmit sounds telegraphically, had revolutionized social life in just a few years. In just five years, the major cities of the United States were connected by telephone lines, consisting of pairs of devices linked in a binary dialogue. The telephone itself underwent rapid evolution. With ingenious switching systems, it became possible to route calls among multiple recipients. The telephone became a tool of mass communication, and its technology prompted other important developments. In 1881, at the International Electricity Exhibition in Paris, the Théâtrophone presented by engineer Clement Ader was on display, along with other fundamental inventions such as Edison's incandescent light bulb and Siemens' electric tram. It worked thanks to two receivers resembling seashells that, when held to the ears, allowed the user to listen to opera arias currently being performed on the stage of the Opéra Garnier, over two kilometers away. Eighty carbon microphones were positioned on the stage, 40 on each side, thus creating a stereophonic sound effect. The signal traveled through underground cables that connected the Exposition building to the theater. Within a few years, Ader's invention became a commercial service. From 1890, the Compagnie du Théâtrophone offered services to private individuals and public institutions. The theater benefited immensely from the arrival of the théâtrophone, which quickly spread throughout the world. It was used until 1932, after which it was supplanted by radio and the phonograph.

Electric Time in Naples: Public Clocks Between Precision and Urban Modernity in the 19th Century

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Within the context of the urban transformations promoted by Ferdinand II, ranging from the Naples-Portici railway and gas lighting to road reorganization and telegraphy, the introduction of public electric clocks in Largo Mercatello and Largo di Castello contributed to redefining the image of a capital in dialogue with major European cities. Acquired in London following the Great Exhibition of 1851, these devices were not merely practical tools for regulating daily life but true urban landmarks of precision, modernity, and technological ambition.

Through a preliminary study of archival documents and contemporary chronicles, this talk reconstructs the complex histories of the two installations. The clock in Largo Mercatello, now Piazza Dante, equipped with a rare equation-of-time dial showing the difference between true solar time and mean time, represented a sophisticated example of scientific dissemination integrated into public space. By contrast, the clock in Largo di Castello, today Piazza Municipio, offered a complementary form of innovation, combining electrical transmission, illuminated dials, and high urban visibility, in line with the needs of a city developing modern infrastructure.

Comparing the two systems demonstrates how time measurement became an integral part of the Bourbon state's effort to modernize its scientific culture and public self-representation, while also revealing how these technological innovations were perceived and experienced by the city's inhabitants.

Two electroscopes, a magnetic needle, and a barometer: Luigi Palmieri and the 1851 Melfi earthquake

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In 1852, after approximately seven months of investigation in the area affected by the earthquake, Luigi Palmieri and Arcangelo Scacchi published an interesting report titled: "Della regione vulcanica del Monte Vulture e del tremuoto ivi avvenuto nel dì 14 agosto 1851", commissioned by the Royal Academy of Sciences of Naples. Having found no evidence on site that the event was attributable, as had been feared, to the volcanic nature of the area, they devoted themselves to extensive geological and mineralogical research in order to understand the relationship between the nature of the territory and the distribution of the catastrophic effects observed. Furthermore, using instruments brought there from Naples, they monitored possible connections between the tremors - which were still being felt in those areas - and the data on atmospheric electricity, atmospheric pressure, and terrestrial magnetism provided by those instruments. In their view, these were to be considered the indispensable physical elements for understanding the causes of the phenomena underway. Among the figures in the engravings accompanying the report is a fine drawing illustrating how Palmieri used a Bohnemberger electroscope to "promptly ascertain the nature of atmospheric electricity" and a needle electrometer that served to measure voltages. It is evident that at that moment Palmieri - who would soon go on to invent the electromagnetic seismograph - still hoped to refine

these devices so that they could instrumentally detect the signs of impending earthquakes, which animals, on the other hand, sensed by "instinct".

Behind the scenes of the Musée Curie: an insider view on science communication and dissemination in a history-of-physics museum

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The Musée Curie in Paris, housed in the historic premises of the Institut du Radium, is a significant European site for the history of physics and for the public understanding of science. This contribution offers an insider perspective on the museum's science communication activities, grounded in a six-month visiting experience that provided direct access to its daily workings, its staff, and the design processes behind its outreach initiatives.
This privileged vantage point makes it possible to go beyond a merely descriptive account and to reflect on how communicative choices are conceived, shaped, and implemented from within. The museum's outreach programme is rich and varied: it includes a hands-on radioactivity workshop — which the author both attended and evaluated through purpose-designed questionnaires administered to participants — a blog, a graphic novel on the méthode Curie, documentary films and videos, interactive booklets for young visitors structured around games and quizzes, and theatrical performances inspired by Marie Curie's life and science.
By combining this firsthand experience with an analytical lens, the contribution aims to reflect on the role of history-of-science museums as active agents of scientific culture, and to discuss how historical narratives can be translated into engaging and pedagogically effective public experiences.

Section

Dialogue Between History, Education, and Public Outreach in Physics and Astronomy

Venue: Museum of Physics of Naples, Great Hall

Astronomy as a Meeting Point of Knowledge. Astro Sardegna: A Residential Training Program for Teachers and Students

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From April 21 to 24, 2026, the fourth edition of the residential training event promoted by the "Astro Sardegna" network of schools was held in Lanusei, Tortolì, and Arbatax.
The event featured seminars by distinguished luminaries in the scientific and literary fields, as well as the award ceremony for a competition for first- and second-year students of Sardinian schools, entitled "We Are Stardust!" The competition once again addressed the theme of "reflections on the unity of scientific and humanistic cultures; the contribution of astronomy and astrophysics from antiquity to the present day". The competition alludes to the Universe, whose elements form from simple atoms to increasingly complex elements. The competition was launched for the first time by the lead school, the "Leonardo Da Vinci" Institute of Lanusei, which established the theme in full coherence with its programs to expand its educational offerings and promote excellence, with the goal of stimulating critical reflection on the long journey undertaken by humanity in its attempt to explain the origins of the Universe.
The course, aimed at both teachers and students participating in the network, aimed to foster the development of teaching methodologies aimed at highlighting the extraordinary richness of our cultural and scientific heritage, starting with Astronomy as the unifying thread, stimulating critical reflection on the long journey that humanity has undertaken over the centuries in its attempt to explain the origins and evolution of the Universe, first through critical thinking, then through increasingly in-depth observations and increasingly advanced tools.

Attraverso le equazioni: studenti di fisica alla ricerca di significato

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Negli ultimi anni stanno emergendo tra gli studenti di fisica domande che difficilmente trovano spazio nei percorsi formativi tradizionali. Sempre più spesso essi manifestano interesse per la storia delle idee, per il significato culturale e disciplinare delle teorie, per i rapporti tra scienza e società, per il ruolo della creatività nella ricerca e per i meccanismi attraverso cui si costruisce la conoscenza scientifica.
Tali richieste non sembrano esprimere il desiderio di un semplice arricchimento culturale, piuttosto suggeriscono che una preparazione esclusivamente centrata sulle competenze tecniche rischia di lasciare in ombra aspetti essenziali per comprendere che cosa sia la fisica, quale significato abbiano i suoi contenuti scientifici, come essa si sviluppi e quale ruolo svolga nella cultura contemporanea.
A partire da alcune esperienze e osservazioni maturate negli ultimi anni, l'intervento propone una riflessione sul significato della formazione universitaria in fisica e sul contributo che la storia della fisica, la riflessione epistemologica e la ricerca in didattica della fisica possono offrire alla costruzione di una figura di fisico più consapevole del contesto culturale, storico e sociale nel quale la ricerca prende forma. In particolare, si discuterà come il riconoscimento e l'attenzione a tali dimensioni possano costituire una condizione importante per un apprendimento realmente significativo dei contenuti scientifici stessi, favorendo una comprensione più profonda della disciplina e dei processi attraverso cui essa produce conoscenza.
L'obiettivo non è discutere come integrare la formazione scientifica con elementi esterni ad essa, ma interrogarsi su quali dimensioni siano necessarie affinché tale formazione possa dirsi sufficientemente completa.

Photon-tology: Everybody Uses It, No One Knows What It Is

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The concept of the photon is often presented in physics education without highlighting the historical and epistemological processes that led to its development. To clarify the current understanding of the term "photon," the present study traces its evolution from Einstein's "light quantum" hypothesis till the development of quantum radiation theory and quantum optics.
Two main conceptual issues are identified. The first concerns the need for a quantized description of electromagnetic radiation, which provides the theoretical foundation for the light quantum. The second concerns interference phenomena, traditionally interpreted as evidence of the wave nature of light. During the past 50 years, single-photon interference and correlations between distinct detection events showed that the photon cannot be reduced to classical models such as wave or particle.
This analysis highlights how the meaning of the photon emerges within the formalism of quantum radiation theory and through experimental detection procedures, blending its definition. From this perspective, the history of the photon does not appear as a linear sequence of discoveries, but rather as a process of a series of conceptual

reformulations. Such an approach may contribute to a more critical understanding of the foundations of physics and to a more effective integration of these perspectives in teaching/learning processes.

Small Steps in Science. The Enrico Fermi Museum for Primary School

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The Historical Museum of Physics and Enrico Fermi Study and Research Center has developed an educational programme for primary school pupils focused on the concept of energy, a topic often subject to misconception. The initiative combines classroom based experimental activities with a visit to the Via Panisperna museum, where installations and historical materials introduce the figure of Fermi, the atom, and nuclear fission. The first phase includes simple experiments on energy transformations and small group work supported by a laboratory booklet. The second phase employs interactive activities and a game simulating the chain reaction. Anonymous pre and post tests allow for an evaluation of the programme's effectiveness. The results show that a practical and contextualised approach can significantly improve children's understanding of energy.

Building Time: An Educational Workshop on the Shepherd's Dial between the History of Astronomy and Citizen Science

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The shepherd's dial is a historical portable sundial that offers a valuable opportunity to explore the relationship between astronomical observation, timekeeping, and geographical location. This contribution presents an educational workshop centered on the construction and use of shepherd's dials, designed to integrate the history of astronomy, inquiry-based learning, and citizen science practices.

The activity began with an introduction to the historical development of portable sundials and their role in everyday life before the widespread adoption of mechanical clocks and modern timekeeping systems.

Participants then built their own shepherd's dials, calibrating them according to the latitude of their home cities. This hands-on experience provided an opportunity to investigate the astronomical and geometrical principles underlying the instrument, including the apparent motion of the Sun, latitude dependence, and the distinction between solar and civil time.

In a subsequent observational phase, participants used their instruments in real-world conditions, recording and comparing the time indicated by the shepherd's dial with civil time and local solar time. The collected observations were shared and analyzed collaboratively, allowing participants to engage directly in data collection and interpretation processes characteristic of citizen science projects.

The workshop demonstrates how the reconstruction and use of historical scientific instruments can foster a deeper understanding of fundamental astronomical concepts while promoting active public engagement with science.

The project highlights the educational value of combining historical perspectives, practical experimentation, and participatory scientific practices, offering a replicable model for science education and public outreach activities in the history of astronomy.

The Historical Museum of Physics Education of the G. Bruno – R. Franchetti High School in Venice-Mestre

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As part of the enrichment of the educational offerings at the IIS G. Bruno – R. Franchetti in Venice-Mestre, a project is currently underway to establish a Historical Museum of Physics Education. The goal is not merely to display the antique instruments owned by the school—which was founded in the 1930s—but rather to create a true museum dedicated specifically to the teaching and learning of physics.
In a dedicated space, the high school's scientific library has been gathered. Within this environment, exhibitions of various educational materials have been set up with the intent of comparing the tools and methods used to build physics concepts today versus those used 40–50 years ago. The core of the museum consists of two historically famous physics education laboratories: the PSSC (Physical Science Study Committee) laboratory and the IPS (Introductory Physical Science) laboratory, both of which have a long-standing tradition in physics instruction at the Bruno-Franchetti institute. The work currently being carried out involves cataloging the experiments and verifying their feasibility, in order to make them available to the school community for outreach and training activities.
Centred around the Museum, several training activities have been conducted for students, who have overseen the setup of experiments for display, produced videos to illustrate the museum's activities, and designed the promotional poster.

Engaging for Scientific Heritage: Teaching Experiences in Secondary Education through Historical Instruments, Museums, and Science Education

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This contribution presents two case studies where secondary-school students engaged with scientific and technological heritage. The initiative falls within the project Va3SCoDi - Valorizzazione degli Strumenti Scientifici Storici per la Conoscenza e la Didattica - at the Department of Chemistry and Industrial Chemistry, University of Pisa. The project focuses on the study, documentation, cataloguing, and educational use of historical scientific instruments.
The first case concerns the historical physics cabinet of the Liceo Classico Parini in Milan, restored in the year 2000 with the support of ARASS Brera. At the initiative of Renzo Traversini, a third-year class was guided through

a non-invasive analysis aimed at identifying, describing, and understanding instruments related to the physics curriculum. The activity drew on ICCD criteria for scientific and technological heritage, and on artefact-study models such as those of Gessner and Winterthur.

The second case took place at the Museum of Natural History in Rosignano, MuSNa, a partner of Va3SCoDi, with students from two schools in Livorno province: the Enrico Mattei Applied Sciences High School and the Enrico Fermi Scientific High School. Collection objects introduced themes in the history of physics and chemistry, subsequently developed through the reconstruction of a voltaic pile and a spectroscope using ordinary materials. The contribution advances the view that historical scientific instruments may mediate between scientific learning, material culture, and the ethics of conservation. Contextualised, such instruments allow students to approach science not merely as abstract knowledge, but as a historically situated practice embodied in unique, fragile objects of cultural value.

Discussion

Venue: Museum of Physics of Naples, Great Hall

Discussion Moderator: Marisa Michelini (*University of Udine*)

Section

History of Physics in 20th Century

Venue: Museum of Physics of Naples, New Hall

Vincenzo Galilei and the empirical law on vibrating strings

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Not only was Vincenzo Galilei (1520–1591) the father of Galileo Galilei, he was also one of the leading figures of the late Renaissance musical revolution, which was characterised by an empirical approach. A vast body of literature exists on the role of experience and experimentation in Galilei's work. Opinions range from Stillman Drake's (1974) high regard for Galilei as a pioneer and founder of the modern scientific method, to Daniel Pickering Walker's (1973) denial that he ever conducted an experiment. In this work, we will attempt to shed light on the role experimentation played in Galileo's discovery of the principal laws of musical string vibration (Mersenne's law) by conducting a close analysis of all his available writings. Some of these were published during Galileo's lifetime; others have been transcribed and published in modern times. A few are still in manuscript form and are preserved at the National Library of Florence.

On Hamilton's View and Use of Finite Differentials

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William Rowan Hamilton, Royal Astronomer of Ireland from 1827 to 1865, was one of the most prolific and brilliant mathematicians of the XIX century. Mostly known among physicists for his early works in optics and dynamics, starting from 1843 Hamilton devoted himself almost exclusively to the development of quaternions, new mathematical objects he invented in the attempt to extend complex numbers to tridimensional space. Today quaternions are usually remembered as the first example of non-commutative calculus and as an important milestone in the advent of modern abstract algebra. However, in Hamilton's own view, quaternions were first and foremost *geometric* objects expressing the intrinsic and coordinate-independent relationship between two directed lines in space. This aspect, which has been often overlooked by later commentators, was clearly perceived by Peter Guthrie Tait, who in 1858 started a long correspondence with Hamilton and became his only true pupil about quaternion methods. In particular, Tait was puzzled by Hamilton's use of differentials as *finite* quantities which can be manipulated according to well-defined rules. In this communication I will discuss two unpublished letters from Hamilton to Tait (Letters V and X, MSS TCD/2172) in which the master explained his general view of differential calculus and how, in generalizing its notions to quaternions, he was guided by a re-interpretation of Newton's geometrical method of the *Principia*. The result is a new, powerful and coordinate-independent approach to the problem of motions that is extremely interesting, and essential to understand all the physical applications of quaternions.

Productive Errors and Serendipitous Events: How Anomalies, Dead Ends, and 'Failed' Experiments Drive Scientific Discovery in Physics and Astronomy

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This paper examines how anomalies, errors, and unexpected findings constitute constitutive - rather than merely incidental - moments in the history of physics and astronomy. Building on Barber and Fox's classic case of "floppy-eared rabbits", which illustrates how "lost" and "gained" serendipity shape discovery, I extend this analysis to landmark episodes in the history of the physical sciences.

Cases of gained serendipity - where anomalies or apparent failures unexpectedly opened onto major discoveries - include Jocelyn Bell's detection of pulsars and Penzias and Wilson's cosmic microwave background radiation. Yet serendipity is not the only engine of productive error: Enrico Fermi's celebrated "discovery" of transuranic elements in 1934 represents a paradigmatic case of productive misinterpretation, in which a systematic experimental error - correctly recognizing the results as nuclear reactions, yet misidentifying their nature - ultimately enabled to achieve the discovery of nuclear fission. Similarly, the anomalous precession of Mercury's orbit and the perturbations of Uranus proved generative: the former eventually confirmed General Relativity, the latter led to the prediction and discovery of Neptune.

What unites these cases is that their productive dimension tends to be retrospectively erased from canonical

historiography and formal scientific communication, which present discoveries as linear progressions rather than as processes punctuated by misinterpretation, friction, and contingency. Drawing on philosophy of science, I argue that reinstating error and anomaly as epistemic categories offers a richer and more accurate model of how scientific knowledge emerges, with implications both for the history of physics and astronomy and for scientific pedagogy.

History of the Mathematical Techniques of Conservation Laws in Classical Theoretical Mechanics

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The symmetry techniques of L. Carnot, Lagrange and Hamilton are revisited in the light of the two dichotomies of foundations of theoretical physics, i.e. theoretical organization and infinity. Their mutual relationships are highlighted and their differences from the Newtonian paradigm are emphasized.

Conceptual Pathways to Entropic Gravity: A Computational Semantic Approach

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This presentation investigates the semantic evolution of the concept of "entropic force" and its use across physics, biology, and soft-matter research. By analysing scientific articles downloaded from arXiv, we aim to reconstruct how this notion circulated between different research fields since the late twentieth century and how interdisciplinary exchanges contributed to its transformation over time. Particular attention is given to the ways in which a concept originally developed in specific science contexts was progressively adopted, reinterpreted, and extended in other domains of scientific inquiry.

A central objective of our work is to understand the conceptual path that led to the interpretation of gravity as an entropic force, as proposed by Erik Verlinde in 2010. To carry out this analysis, computational tools such as SciBERT will be used to build embedding vectors for the key concepts involved and to trace their semantic relationships across a corpus of scientific texts. By combining computational semantics with perspectives from the history of science, we examine how scientific concepts migrate across disciplinary boundaries, acquire new meanings, and contribute to the emergence of novel theoretical frameworks.

SETIAI (SETI + AI) – Distributed technological civilizations and the Drake equation

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Nel 1961 Frank Drake propose la celebre equazione destinata a divenire uno dei più noti strumenti concettuali della ricerca sull'intelligenza extraterrestre. Più che una teoria compiuta, essa rappresentava una provocazione scientifica; un utile schema per organizzare la discussione sui fattori necessari alla comparsa di civiltà tecnologiche comunicanti. A quasi settant'anni dalla sua formulazione, osserviamo come quell'equazione abbia influenzato non soltanto il dibattito scientifico, ma anche l'immaginario fantascientifico, contribuendo alla costruzione di inediti scenari narrativi. Molti suoi termini dal valore allora ignoto sono stati nel frattempo meglio definiti grazie all'astronomia osservativa e all'astrobiologia. Parallelamente nuove tecnologie –AI, robotica autonoma, sistemi destinati all'esplorazione spaziale – hanno introdotto inediti problemi interpretativi. In questo talk proporremo un ampio percorso storico che, nonostante la grande attenzione ricevuta da tali tematiche in ambito fantascientifico e il rinnovato interesse da parte del mondo scientifico, terminerà con una nuova riflessione avente a che fare con la possibilità che una civiltà biologica possa estendere la propria presenza in un sistema planetario mediante colonie di androidi operanti come suoi avatar. Tale ulteriore prospettiva conduce a un'ipotesi interpretativa che, per quanto ci consta, non è stata finora esplicitamente discussa nel dibattito SETI. Essa dipinge uno scenario nel quale una singola civiltà genera molteplici siti tecnologicamente attivi e osservabili che, se valutati da lontano, apparirebbero come vere e proprie civiltà tecnologiche, mettendo così in discussione la sempre supposta coincidenza tra civiltà, luogo che la ospita e sorgente delle emissioni rilevabili, e comportando di conseguenza nuovi valori per alcuni termini di quella equazione.

Visit to the Museum of Physics

The visit includes access to the Museum of Physics of the University of Naples Federico II, showcasing an extraordinary heritage of historical scientific instruments dating from the late 18th century to the 20th century, including rare pieces from the Royal Bourbon collection and the historical Physics Cabinet.

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18 September

Section

The Development of Meteorology and Volcanology

Venue: Vesuvius Observatory, Palmieri Hall

A historical perspective on bradyseism at Campi Flegrei caldera

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Campi Flegrei is one of the most emblematic volcanic areas in the world for the study of bradyseism, a phenomenon characterized by slow ground uplift and subsidence, often accompanied by seismicity, changes in hydrothermal activity, and variations in gas emissions. The historical record of vertical ground movements in the caldera is exceptionally long and well documented, thanks to archaeological, geological, and instrumental evidence.

The remains of the Roman market of Pozzuoli, traditionally known as the Serapeum, represent one of the most iconic markers of long-term ground deformation, recording alternating phases of subsidence and uplift over the last two millennia. The most dramatic historical expression of bradyseism occurred before the 1538 eruption of Monte Nuovo, when significant uplift affected the Pozzuoli area and culminated in the birth of a new volcanic cone.

In the twentieth century, two major bradyseismic crises occurred in 1969–1972 and 1982–1984, producing remarkable ground uplift, intense seismicity, damage to buildings, and the evacuation of part of Pozzuoli. Since 2005, Campi Flegrei has entered a new phase of unrest, marked by progressive uplift, increasing seismic activity, and persistent hydrothermal degassing, particularly in the Solfatara–Pisciarelli area.

This contribution reviews the main stages of bradyseism at Campi Flegrei, integrating historical observations with modern monitoring data. Understanding the evolution of past and ongoing unrest is essential for interpreting the present dynamics of the caldera and for improving volcanic hazard assessment in this densely populated area.

Climate through the lens of the historical built environment: bridging early meteorological observations with microclimatic analysis at Santa Maria degli Angeli, Florence (1654–1670)

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The complex of Santa Maria degli Angeli, located in the historic center of Florence, Italy, represents one of the main stations of the observational network promoted by the Medici family in the second half of the seventeenth century (1654-1670).

This contribution builds on a previous research phase aimed at identifying - within the cloister - the plausible location where the two thermometers were positioned in opposite directions, through the combined analysis of the original manuscripts and solar path.

The study proposes an investigation based on digital modelling and the simulation of the cloister's thermal behavior. The aim is to analyze the relationship between the temperatures historically recorded by the two thermometers and the site's microclimatic conditions, also considering the surface temperatures of the relevant façades and their influence on the measurements.

This approach assesses whether the seventeenth-century measurements primarily reflected air temperature or were influenced by the thermal conditions of the wall surfaces. This aspect is fundamental for making historical series comparable with contemporary , ERA5 2 m air temperature hourly data provided by the Copernicus Climate Data Store (CDS) and extracted at the coordinates of the historical observational stations for periods corresponding to the duration of each historical series.

The study contributes to a more accurate interpretation of the meteorological observations of the Medici Network, providing elements for assessing the reliability of the historical series, identifying possible methodological corrections, and using them in comparison with contemporary temperature series and in the study of long-term climatic variations.

Atlas of Aetna (1845–61) by W. Sartorius von Waltershausen: The Birth of Modern Volcanological Cartography

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The Atlas of Aetna, a monumental work by Prussian Baron Wolfgang Sartorius von Waltershausen (1809–1876), professor of mineralogy and geology at the University of Göttingen, is universally recognized as the first and oldest geological map in the world entirely dedicated to a major active volcano. This work represents an absolute milestone in the history of Earth Sciences, marking the definitive transition from purely naturalistic and artistic descriptions to quantitative and stratigraphic geological cartography. Fascinated by Etna during his travels in Sicily, Sartorius devoted seven years of his life to field surveying the volcano. The Atlas des Aetna consists of nine volumes published between 1845 and 1861, comprising 13 topographical maps and 13 geological maps at a scale of 1:50,000, numerous perspective views, geological and topographical profiles, and a short accompanying text.

It is a scientifically and artistically majestic work, unprecedented for Etna, and overall it constitutes the first topographical and geological map of the volcano. Among the geological cartography of active volcanic areas during the 19th century, Sartorius's geological map of Etna played a primary role in this discipline. Indeed, for another important Italian volcano, Vesuvius, which was very active in those years, cartography was limited only to the production of maps of historical lava flows. Sartorius was the first to map the entire volcanic body as a dynamic, ever-evolving geological system, laying the foundation for modern geological cartography of volcanoes.

The market of meteorological instruments in southern Italy between the 18th and 19th centuries

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In southern Italy, the market for meteorological instruments in the 18th century was limited to the wealthy elite, physicians, and early observatories, which purchased their equipment from northern Italy, France, and Great Britain. However, some Neapolitan physicists designed new instruments themselves, such as Giovanni Maria della Torre, who in 1778 conceived a barometer and sent its design to Ramsden for construction, and Luca de Samuele Cagnazzi, who in 1801 described a variant of Saussure's hygrometer.
In the 19th century, various meteorological instruments were built by local craftsmen, including Giuseppe Spano, Antonio Marino, and Saverio Gargiulo. The latter served as mechanician at the Meteorological and Vesuvius Observatory and produced many of the instruments designed by Luigi Palmieri.
After the establishment of the national meteorological network, observatories in southern Italy were equipped with comparable instruments built in Rome by the renowned mechanician Ermanno Brassart. This basic instrumentation was often supplemented with additional devices purchased individually in Italy or abroad.

After the Casamicciola earthquakes (1881 and 1883): institutionalization and communication of geodynamics

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After the Italian Unification, meteorology was rapidly organized on an institutional basis with the establishment of the Ufficio Centrale di Meteorologia (UCM). Geodynamics followed a different path: still an emerging discipline, it initially depended on the private initiative of researchers such as Michele Stefano De Rossi (1834-1898), who from 1873 promoted a national network of seismic observations and the journal Bullettino del Vulcanismo Italiano. The earthquakes that struck the Ischia Island (Naples Province) in 1881 and 1883 prompted direct state intervention: by Regio Decreto of 20 December 1883, the Regia Commissione Geodinamica was established to organize a national seismic service. Following its decisions, the observatories of Rocca di Papa (Rome Province) and Ischia were developed. The latter were designed by Giulio Grablovitz (1846-1928), an emerging figure in Italian geophysics,

between 1884 and 1891 at Casamicciola and Ischia Porto. Their construction faced technical, financial, and bureaucratic difficulties that required the involvement of several ministries and the UCM directed by Pietro Tacchini (1838-1905). The 1883 earthquake also stimulated interest in the Earth Sciences and encouraged efforts to address public concerns raised by the disaster. The subject gained political support during the Esposizione Generale Italiana 1884, where a pavilion dedicated to meteorology and geodynamics was established. It included an exhibition section with instruments, records, maps, photographs, and publications, together with a functioning observatory open to the public, reflecting a remarkably forward-looking approach to scientific dissemination for the period. Intended to promote scientific dissemination, the initiative mobilized substantial economic and intellectual resources.

Closing Remarks

Valeria Zanini - *President of SISFA*

Conclusions, remarks and acknowledgments

Visit to the Museum and historical collections of the Vesuvius Observatory

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The scientific visit includes access to the historical collections, early seismological instruments, and pioneering vulcanological archives preserved inside the Vesuvius Observatory.

Guided Excursion to the Vesuvius Crater

The Vesuvius Observatory organizes an exclusive guided excursion along the nature path leading to the Great Cone (*Gran Cono*), exploring the volcanological history and geological features of Mount Vesuvius.

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