



# Italian Society of Mineralogy and Petrology

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## MEETING REPORT "THE CENTENNIAL OF X-RAY DIFFRACTION"

*Accademia Nazionale dei Lincei, Roma, May 8–9, 2012*

In 1912, Max von Laue, Walter Friedrich and Paul Knipping designed an experiment that proved that X-rays were waves and that a crystal had a lattice-like structure at the atomic scale. This experiment was the starting point for a giant leap for science, because it opened the way to exploring the atomic and bonding properties of matter and eventually to understanding the molecular basis of life. Since then, two dozen Nobel prizes have been awarded in various branches of science related in some way to crystallography. The centennial of the first diffraction experiments is therefore being celebrated across the world. In Italy, a two-day international conference was held in the beautiful setting of Palazzo Corsini, the headquarters of the Accademia dei Lincei. It was organized jointly by the Accademia dei Lincei and the Accademia delle Scienze di Torino, and was supported by the Associazione Italiana di Cristallografia (AIC), the European Molecular Biology Organization (EMBO) and the University Roma Tre, under the patronage of the European Crystallographic Association (ECA).

Review lectures were given by sixteen internationally renowned speakers, among which two Nobel laureates and a recipient of the 2011 Ewald Prize. Speakers represented many of the branches of science that were revolutionized by the possibility of deciphering the structure of matter at atomic resolution and understanding in detail the relationships among structure, bonding properties and reactivity. Their talks (authors listed below in alphabetical order) were wide ranging and included theoretical and experimental aspects, historical issues and cutting-edge research involving mineralogy, materials science, chemistry, physics, drug design and biochemistry. GIUSEPPE ALLEGRA (Milano): "From X-ray, neutron diffraction and molecular modelling to the structure of crystalline polymers"; GILBERTO ARTIOLI (Padova): "Science for the cultural heritage: The contribution of X-ray diffraction"; ALESSIA BACCHI (Parma): "X ray diffraction as a tool in the path from the design of an active pharmaceutical ingredient to the tablet on the shelf"; TIZIANA BOFFA BALLARAN (Bayreuth): "Diffraction at extreme conditions: A window into the Earth's interior"; MARTINO BOLOGNESI (Milano): "100 years of X-ray diffraction, 50 years of structural biology"; MARCO CAMMARATA (Rennes): "Laser pump and X-ray probe: Insights into the dynamical nature of matter"; GERVAIS CHAPUIS (Lausanne): "Aperiodic structures"; FILIPPO FRONTERA (Ferrara): "Laue lenses for gamma ray astronomy"; CARMELO GIACOVAZZO (Bari): "Phasing in crystallography: A modern perspective"; ROBERT HUBER (Martinsried): "Beauty and fitness for purpose: Architecture of proteins, the building blocks of life"; STEFANO MERLINO (Pisa): "X-ray diffraction and the development of mineral crystal chemistry"; NADIA ROBOTTI (Genova): "The discovery of X-ray diffraction"; PAUL J. STEINHARDT (Princeton): "Quasicrystals: A brief history of the impossible"; BEATRICE VALLONE (Roma): "Time-resolved crystallography for protein structure: Devices and desires"; DAVIDE VITERBO (Alessandria): "X-ray crystallography in Italy: From the early steps to the present days"; JOHN ERNST WALKER (Cambridge): "Biological machines with rotary motors" (EMBO Lecture).

A special issue of *Rendiconti Lincei – Scienze Fisiche e Naturali* will be available at the end of the year ([www.springer.com/environment/journal/12210](http://www.springer.com/environment/journal/12210)). It will contain papers prepared by the speakers relevant to their talks.

The meeting was attended by about 150 scientists and graduate students. They enjoyed very interesting talks and contributed to lively discussions during the sessions and the coffee and lunch breaks. Visits to the unique frescoes and the recently renovated Renaissance gardens of Villa Farnesina (opposite the Palazzo Corsini) and a delicious dinner

provided to the speakers by the Accademia delle Scienze di Torino also contributed to the strengthening of new relationships and the exchange of ideas on the present and future uses of X-ray diffraction and on the frontiers of data interpretation.

The Organizing Committee (M. Brunori, G. Ferraris, A. Mottana [chair], R. Oberti, R. Righini, P. Rossi, G. Setti, A. Zecchina) did excellent work and gave the international and Italian communities a great opportunity to reflect on the prestigious past of X-ray diffraction, on recent achievements and on future developments in many scientific disciplines, during a time when computer science is offering incredible new tools for the structure-based approach to reactions, processes and functional properties of almost any kind of compound in any possible environment. The meeting was an excellent introduction to Italian initiatives relevant to the upcoming International Year of Crystallography (2014).



Participants in the beautiful lecture hall of Palazzo Corsini



Speakers and organizers of the meeting