

June 2-7, 2013 – Sharm El-Sheikh, Egypt

2013 Bloch Príze Recipient:

Prof. Bahram Djafari Rouhani

Institut d'Electronique, de Microélectronique et de Nanotechnologies, Université Lille 1 Sciences et Technologies, Villeneuve d'Ascq, France Felix Bloch (1905-1983) Nobel Prize in Physics (1952)

2013

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Bloch Prize

The Bloch Prize honors the eminent Swiss physicist who among many contributions to wave mechanics and theoretical physics formulated the underlying theory for electron wave propagation in periodic media. His theory, known as *Bloch theory*, laid the foundation for other theoretical developments ultimately leading to a formal classification of all crystals into metals, semiconductors and insulators. In recent years, Bloch theory re-emerged as the basic underlying mathematical condition for formulating the band structure of modern periodic materials such as phononic and photonic crystals. Felix Bloch, who was born in Zurich, Switzerland, on October 23, 1905, pursued his research career in Zurich, Heisenberg, Stanford, Los Alamos and Harvard University, and in 1954 took a leave of absence for one year to serve as the first Director General of CERN in Geneva. He received the Nobel Prize in Physics in 1952 jointly with Edward Mills Purcell "for their development of new methods for nuclear magnetic precision measurements and discoveries in connection therewith".

At Phononics 2011, the *Bloch Prize* (originally called the *Felix Bloch Lecture*) was inaugurated to "honor individuals who have made outstanding and sustained contributions in the field of phononics (including phononic crystals, acoustic/elastic metamaterials, nanoscale phonon transport, coupled phenomena involving phonons, and related areas) over periods representing considerable portions of their scientific careers". The medal is awarded biennially at the time of the Phononics 20xx conference. The winner delivers the *Bloch Lecture* at the conference, and is also invited to write a 6-page *Bloch Paper* to be published alongside the conference proceedings.

The 2013 Bloch Prize recipient is Professor **Bahram Djafari-Rouhani** who is honored for his invaluable contributions to the areas of "superlattices, phononic crystals, phonon-photon interactions, plasmonics, and other related areas" starting with papers that date back to the early 1980s and extending to the present time.

2013 Bloch Prize Committee

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Bahram Djafari-Rouhani

Professor of Physics

Department of Physics

Institute of Electronic, Microelectronic & Nanotechnology University of Lille

Education

1966 High School (Teheran, Iran)
1971 Master of Physics (University of Caen, France)
1974 PhD (University of Paris, Orsay, France)
1978 Thèse d'état (Habilitation, Orsay, France)

Academic career



1979-1980 Postdoctoral position, University of Gent, Belgium
1980-1985 Researcher at the French National Scientific Research Centre (CNRS)
1985-1990 Professor, University of Mulhouse, France
1990-present Professor, University of Lille Science and Technology, France
Head of a theory group on Phononic Crystals and Nanophotonics (6 permanent people and 5-6 PhD, postdocs and master students)

Invited Professor:

Univ. of California, Irvine (July-August1983); Univ. of Los Andes, Merida, Venezuela (July 1987); Univ. Autonoma de Puebla, Mexico (August 1992)

Academic Administration:

Currently responsible of the first year of Master of Physics at the University of Lille Formerly President of the regional section of the French Physical Society (1999-2005) Formerly member of the University councils (2007-2012)

Research: Author or co-author of over 250 papers in international journals, 8 review articles; Supervisor of 20 PhD theses and habilitations and several postdocs among them 14 have got academic positions.

Scientific Activities: Theory and modelling of wave propagation and elementary excitations in heterogeneous and nanostructured materials: phononic and photonic crystals; acoustic metamaterials; photonic and plasmonic waveguides; dual phononic-photonic crystals; light scattering by acoustic phonons; optomechanics.

Main research achievements: Surface acoustic waves in superlattices (1983) and general rules about their existence (1990); Theory of light scattering by acoustic phonons in superlattices (1988); Concepts of phononic crystals (1993) and magnonic crystals (1996) – Subsequent works on engineering of band gaps, defect states and application to waveguiding and filtering, metamaterial type structures; Green function theory of phonon scattering by nanostructures on a surface (1993, 1998); Phononic crystal slabs, demonstration of absolute band gaps (2006, 2008); Dual phononic-photonic band gap crystals (2009), optomechanic interaction in phoxonic cavities (2011); Plasmonic waveguides and their applications in filtering and multiplexing (2004); localized surface plasmon resonance of nanoparticles for biosensing applications (2008)



2nd INTERNATIONAL CONFERENCE ON PHONONIC CRYSTALS/ **METAMATERIALS, PHONON TRANSPORT & OPTOMECHANICS**







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