ABOUT THE ICTP PRIZE SCULPTURE

The ICTP Prize sculpture consists of a plaque emerging out of stone, symbolizing the emergence of new, refined knowledge. The stone base is made of Aurisina marble, which has been quarried in the vicinity of Trieste for more than 2000 years. The special kind of stone and the waves represent Trieste's setting between the karstic hills and the sea.

ICTP, Strada Costiera 11, I-34151 Trieste, Italy www.ictp.it

2018 ICTP PRIZE CEREMONY

9 January 2019
Budinich Lecture Hall
16:30

PROGRAMME

The Abdus Salam
International Centre
for Theoretical Physics

THE 2018 ICTP PRIZE

ICTP has awarded its 2018 ICTP Prize to

Luis E.F. Foà Torres, University of Chile, Santiago, Chile,

and

Hongjun Xiang, Fudan University, Shanghai, China

The Prize recognizes their independent contributions to the theoretical advancement of condensed matter physics of modern solid-state materials, including low dimensional and nanoscale systems.

Theory work by Luis Foà Torres contributed importantly to our understanding of topological insulators, graphene and two-dimensional materials and nanotubes, including quantum transport and optoelectronics.

Hongjun Xiang developed first-principles-based computational methods addressing a vast variety of problems, including low-dimensional materials and multiferroics, where his approach has become standard in the field.

Each year, the ICTP Prize is given in honor of a scientist who has made outstanding contributions to the field in which the prize is given. The 2018 ICTP Prize is given in honour of Kun Huang (1919-2005), the renowned theoretical physicist who is a father of condensed matter and semiconductor physics in China. Of particular relevance to ICTP's mission, Huang personally led a 12-person 'ice-breaking' delegation of Chinese theoretical physicists to ICTP in 1979, a visit that opened the way for wide-ranging exchanges between China and the Centre in the years that followed.

2018 ICTP PRIZE CEREMONY PROGRAMME

Welcome remarks, Fernando Quevedo, Director, ICTP

2018 ICTP Prize Lectures

Using light as a topological switch

Luis E. F. Foà Torres, University of Chile, Santiago, Chile

Light-matter interaction is at the center of intriguing phenomena and has led to many practical applications like, for instance, Raman spectroscopy. But beyond characterization, several studies have gone deeper into actually using light to modify the electrical properties of a material. This can be done, for example, by using light to switch off the conduction in graphene (or other materials), thereby allowing to tune the material's response by optical means, or even inducing tunable topological states in materials that would otherwise lack them (i.e. a Floquet topological insulator). The latter would expand the playground of topological insulators to a broader set of materials. Recent studies have reported the experimental observation of laser-induced bandgaps at the surface of a topological insulator, and the observation of a light-induced Hall response, thereby adding much interest to this area. The talk will provide a brief overview of Foà Torres' work in this field with a focus on the generation of Floquet chiral edge states in graphene and other systems/materials. He will also comment on their Hall response and laser-induced one-way transport of charge and valley.

Theoretical studies on new mechanisms of ferroelectricity and multiferroicity

Hongjun Xiang, Fudan University, Shanghai, China

Ferroelectric and multiferroic (coexisting ferroelectricity and magnetism) materials have attracted numerous interest over several decades due to the exciting possibility of novel applications such as non-volatile memory. To design high-performance ferroelectrics and multiferroics, it is highly desirable to understand and discover mechanisms of ferroelectricity and multiferroicity. Recently, we formulated a unified polarization model for spin-order induced ferroelectricity, developed new methods to compute the relevant interacting parameters, revealed that the ferroelectricity may be enhanced by oxygen octahedral rotations, demonstrated that the ferroelectricity in thin films may be stronger than that in the corresponding bulk, proposed that the simultaneous presence charge order and orbital order can lead to ferroelectricity.