NEWSLETTER

COMMISSION INTERNATIONALE D'OPTIQUE · INTERNATIONAL COMMISSION FOR OPTICS

ICO AWARD TO NANO-PHOTONICS

Dr. Qing Dai was awarded for his groundbreaking contributions to the field of nanoscale light-matter interactions and the identification of its transformative potential for modern technologi-cal challenges.

Dr. Qing Dai is affiliated with both the School of Materials Science and Engineering at Shanghai Jiao Tong University and the National Center for Nanoscience and Technology,CAS.

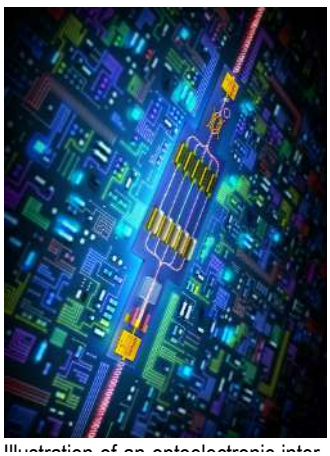

Illustration of an optoelectronic inter-

Dr. Qing Dai earned his Bachelor's degree in Electronic Engineering from Imperial College London and a PhD in Engineering from Cambridge University. After his postdoc at Wolfson College, Cambridge, he returned to China in 2012 to establish a research group on nanophotonics at the National Center for Nanoscience and Technology in Beijing. In 2024, he joined the School of Materials Science and Engineering at Shanghai Jiao Tong University.

The ICO Prize 2024 was awarded to Dr. Qing Dai for his pioneering contributions to nanoscale light-matter interactions. He and his international coworkers have made significant strides in manipulating polaritons in 2-dimensional materials[1-12], advancing the understanding and applications of graphene plasmon-enhanced infrared spectroscopy[13-16], and achieving breakthroughs in ultrafast optically induced electron emission from carbon nanotubes[17-20]. His current research focuses on developing optoelectronic interconnections using polaritons within 2D materials to overcome optical diffraction limits, achieving effective on-chip integration and chips that drastically reduce energy consumption while boosting data transmission rates.

Key problems include minimizing the inherent losses in polariton modes, achieving reliable performance across communication frequency bands, developping essential on-chip photonic devices and further innovating nonlinear modulation capabilities for polaritonic systems. Challenges in heterogeneous integration must be tackled, alongside the need to facilitate polariton storage and matrix computations, which could support data-intensive applications.

Dr. Qing Dai's interdisciplinary team's primary objective is to establish a scalable, high-speed, and low-energy optoelectronic interconnection framework based on polaritons, which aligns with the societal demand for greener technology by enabling energy-efficient optical interconnects and optical computing systems.

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ICO VP Kaoru Minoshima chairs the ICO Award Committee

EARLY CARRER SCIENTIST PRIZE IN OPTICS 2024

The ICO-IUPAP award recognizes his advances in non-equilibrium dynamics, quantum simulations, and the theoretical modeling of experimental data.

Dr. Bhattacharya is committed to advancing both classical and quantum simulation methodologies to provide deeper insights into intricate physical systems.

Dr. Utso Bhattacharya completed his undergraduate studies in Physics at Presidency College, where he was awarded the Swapan Saha memorial gold medal for academic excellence. He then pursued a Ph.D. at the Indian Institute of Technology (IIT) Kanpur under the supervision of Prof. Amit Dutta. His doctoral research, recognized with the institute's "Outstanding Thesis Award," focused on "Aspects of Non-Equilibrium Dynamics of Quantum Systems: Information, Phase Transitions, and Topology." During this time, he made notable contributions to the understanding of dynamical quantum phase transitions [1, 2] and the interplay between time aperiodicity and thermalization in driven quantum systems [3, 4], in collaboration with Prof. Diptiman Sen (IISC, Bangalore). Following his Ph.D., he joined Prof. Maciej Lewenstein at ICFO, Barcelona as Cellex ICFO-MPQ Fellow. Subsequently as a La Caixa Junior Leader, he led projects on ultrafast superconductivity and the dynamic probing of exotic phases in strongly correlated systems, such as pseudogaps and metal-insulator transitions. His experimental collaboration with Prof. Jens Biegert (ICFO), encompassed the theory of strong light-matter interactions and strongly correlated quantum matter, developing a theoretical framework for high harmonic generation in cuprate superconductors [5]. His other notable contributions include the quantum simulation of the extended Bose-Hubbard model [6], conducted in collaboration with theorists Prof. Tobias Grass (DIPC, San Sebastian) and Prof. Ravindra W. Chhajlany (AMU, Poznan), and the CNRS experimental team led by Prof. Francois Dubin. This work explored symmetry-breaking phases and marked a significant step toward realizing macroscopic supersolid phases in solid-state simulators. Additionally, he worked to develop a novel quantum simulation platform using carbon nanotube-based quantum dots [7, 8] in collaboration with the experimental group of Prof. Adrian Bachtold (ICFO). This study addressed challenges in simulating electron-phonon interactions in conventional platforms, paving the way for new quantum simulation applications.

Currently, he is an ETH-IBM research fellow, working with Prof. Manfred Sigrist and Prof. Eugene Demler at ETH Zurich, and Prof. Ivano Tavernelli at IBM Research, Zurich. His current research focuses on ultrafast processes in electron-electron and electron-phonon systems, quantum computation utilizing IBM quantum computers and quantum dot based simulations (Vandersypen Lab, TU Delft), and the quantum simulation of exotic long-range physics in trapped ions and spin-cavity systems.

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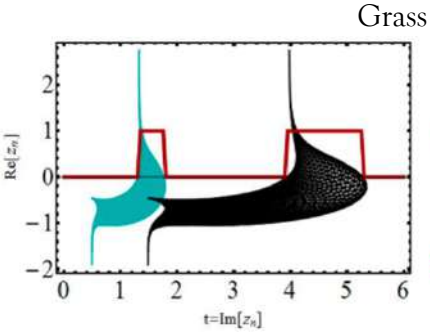
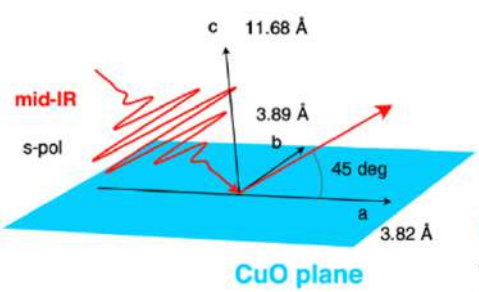
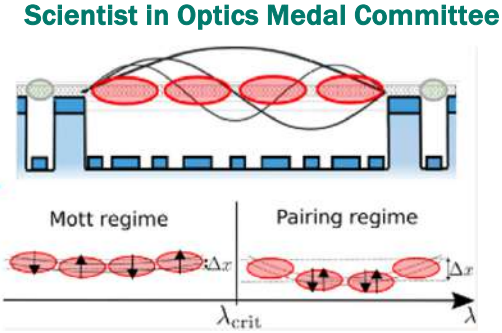
ICO VP Yaseera Ismail chairs the ICO-IUPAP Early Carrer Scientist in Optics Medal Committee



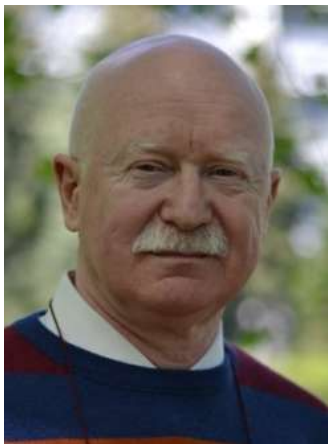




Non-equilbrium dynamical quantum phase transitions (left from [1]), light induced phase detection in cuprates (middle from [5]), quantum dot quantum simulator of electron-phonon interactions (right from [7]).

Galileo Galilei Medal Award to Victor Reshetnyak

The Photoalignment technique is currently widely used in liquid crystals studies and applications.



Prof. Victor Reshetnyak is Emeritus Professor at the Theoretical Physics Department of Physics Faculty, Taras Shevchenko National University of Kyiv, Kyiv, Ukraine.

Prof. Victor Reshetnyak received his MSc degree in Theoretical Physics (1st class diploma) PhD and DSc degrees in Theoretical and Mathematical Physics in 1980, 1985 and 1994, respectively from Taras Shevchenko National University of Kyiv, where he was a full professor since 1999 and the head of the Theoretical Physics Department from 2017 till 2022. He has more than 40 years of experience of studies of liquid crystals and in 2010-14 he served as a member of the International Liquid Crystal Society Board. He also was a member of Optics of Liquid Crystals meetings Advisory Board during 2009-2017. He is an associate editor of Optical Materials Express, a Member of the Editorial Board MDPI journal "Crystals", section Liquid Crystals. Prof. Reshetnyak has published more than 280 papers in leading journals and obtained 12 patents. He is a co-inventor of photo-alignment technique [1,2], liquid crystals doped with ferroelectric nanoparticles [3,4] and nanoparticle doped hybrid photorefractives [5]. Doping liquid crystals with ferroelectric and ferromagnetic particles allows to significantly increasing the sensitivity to external electric and magnetic fields. His research achievements has been recognized by national and international awards, including the National Acade-my of Sciences of Ukraine A.F. Prihot'ko prize "For studies of the physical background and applied aspects of liquid crystals photo-orientation" (2012) and George Gray Medal of the British Liquid Crystal Society (2023). His interests include tunable liquid crystal lenses and free forms [6,7]; effective medium theory of heterogeneous media [8,9]; polymer dispersed liquid crystals [10-12]; tunable metamaterials [13]; photorefractive effect in organic-inorganic hybrids; liquid crystals filled with core-shell nano- and micro-particles [14]; surface and Tamm plasmons [15,16]; tunable THz absorbers [17]; liquid crystal elastomers; ferroelectric liquid crystals.

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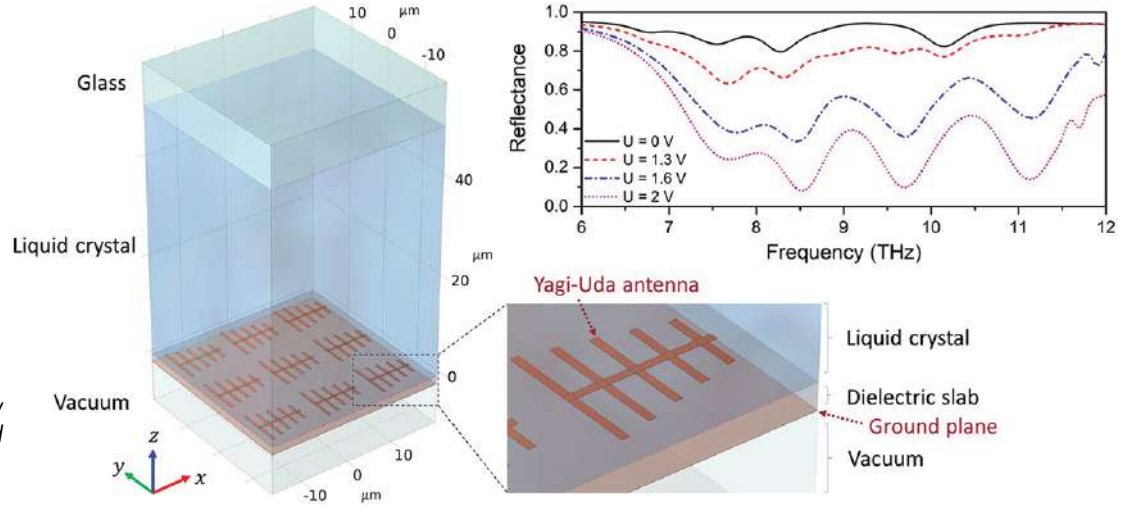
ICO VP Andrey Naumov chairs the Galileo Galilei Medal Award Committee



Tuning Yagi-Uda antennas array reflectance with help of liquid crystal from [17].

ICO Participates in the General Assembly of the ISC

The ISC General Assembly meets in ordinary session every four years.

Prof. Humberto Michinel, ICO Secretary-General with Silivina Ponce, IUPAP President at the ISC meeting in Muscat, Oman.

The third General Assembly of the International Science Council (ISC) has been celebrated in Muscat, Oman, during 29-30 January 2025 and the ICO has been represented by its Secretary General, Prof. Humberto Michinel.

The General Assembly (GA) is the highest authority of the Council and consists of representatives of its Members, providing a forum for conducting ISC business and allowing leading scientists to identify and discuss the world's most pressing scientific issues.

The ISC GA is also responsible for setting the general direction, policies and priorities of the Council. The first General Assembly of the ISC took place in Paris, France, in July 2018. This has been the first in-person General Assembly of the ISC since the creation of the organization in July 2018.

During the meeting, networking sessions took place, especially amongst category 1 – full members, like ICO or IUPAP, among other International Unions. The ISC General Assembly is the premier occasion for ISC Members and Affiliated Bodies, Fellows and partners from all domains of science and regions of the world to meet for cross-disciplinary, strategic discussions on challenges and priorities for international cooperation in science. **Previously to** the ISC General Assembly, it took place an event called "The Muscat Global Knowledge Dialogue", hosted by the Ministry of Higher Education, Research and Innovation of Oman, under the patronage of His Highness Sayyid Asaad bin Tariq Al Said, Deputy Prime Minister for International Relations and Cooperation Affairs and Personal Representative of His Majesty the Sultan.

The dialog was organized around three main streams: science systems and science futures (covering issues around current and anticipated developments in science, including AI and other emerging technologies, open science, research assessment, science publishing and transdisciplinary science); science and just transformations to sustainability (focusing on the role of science in the social and environmental transformations needed to move towards sustainability) and science and society (addressing issues around trust in science, the use of science in and for diplomacy, social cohesion and inequalities, and gender equality.

Prof. Humberto Michinel
ICO Secretary General

Contacts

Forthcoming events with ICO participation

Below is a list of forthcoming events with ICO participation.
For further information, visit their official websites listed below.

24-28 August 2025
XIII Annual Meeting of the European Optical Society. EOSAM

Delft, The Netherlands
Contact: Elina Koistinen
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https://europeanoptics.org

17-21 November 2025
RIAO-OPTILAS 2025. XII Iberian-American Meeting on Optics . XV Latin-American Meeting on Optics, Lasers and Applications
Santa Cruz de la Sierra, Bolivia
Contact: Omar Ormaechea
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