NEWSLETTER

COMMISSION INTERNATIONALE D'OPTIQUE · INTERNATIONAL COMMISSION FOR OPTICS

ICO Prize to Shuntaro Takeda

Prof. Takeda pioneered loop-based architectures for scalable optical quantum computing.



Prof. Shuntaro Takeda is an Associate Professor in the Department of Applied Physics, School of Engineering, The University of Tokyo, Japan.

Prof. Shuntaro Takeda has been awarded the 2026 ICO Prize "for outstanding and pioneering contributions to optical quantum computing, particularly deterministic quantum teleportation of optical qubits and its application to scalable optical quantum computing architectures." He received his B.S., M.S. and Ph.D. degrees from the University of Tokyo, where he has led his own research group since 2019.

He first demonstrated deterministic quantum teleportation of photonic qubits with a hybrid technique combining discrete-variable encoding and continuous-variable teleportation, orders of magnitude more efficient than conventional approaches [1,2]. This hybrid teleportation circuit can serve as a fundamental building block for operations in a wide range of quantum information protocols, providing a foundation for scalable quantum information processing.

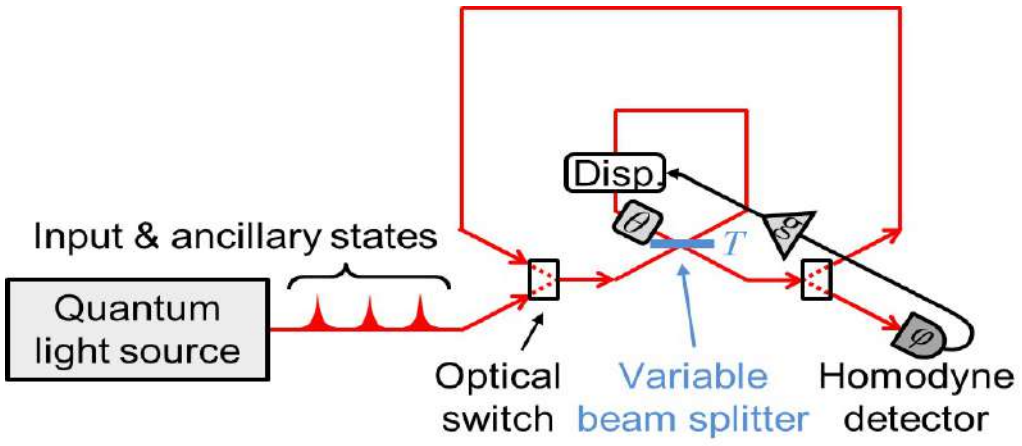
Building on it, he proposed the loop-based architecture, in which optical pulses repeatedly circulate through a programmable processing circuit, enabling sequential quantum operations with minimal hardware [3]. His group demonstrated its key components, scaled it to programmable multi-mode, multi-step processing [4–6] and extended it to non-Gaussian states [7,8], essential for universal, fault-tolerant continuous-variable quantum computation and going beyond the capabilities of most existing photonic platforms.

Recent work includes active suppression of loss-induced decoherence [9], programmable quantum light sources [10], and applications to quantum sensing, optimization and machine learning [11–13]. Through these developments, he aims to build scalable and versatile photonic quantum processors.

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ICO VP Prof. Kaoru Minoshima chairs the ICO Prize Committee



Loop-based optical quantum computing architecture proposed and experimentally developed by Prof. Takeda and collaborators.

ICO/IUPAP Medal to Visual Optics

Dr. Rodríguez López studies how the human eye perceives blur and turns that knowledge into new clinical instruments.



Dr. Víctor Rodríguez López is a Principal Investigator at the Visual Optics and Biophotonics Laboratory (VioBio Lab), Institute of Optics (IO-CSIC), Madrid, Spain, and founder of SureVision Tech.

Dr. Víctor Rodríguez López has received the ICO/IUPAP "Early Career Scientist Prize in Optics Medal" for developing new methods to measure refractive error and for advancing the understanding of how the human eye perceives blur. He received his PhD in Biomedical Science and Technology with honors (Cum Laude, International Doctorate) from Carlos III University of Madrid in 2022, with the research carried out at the Institute of Optics of the CSIC, Spain.

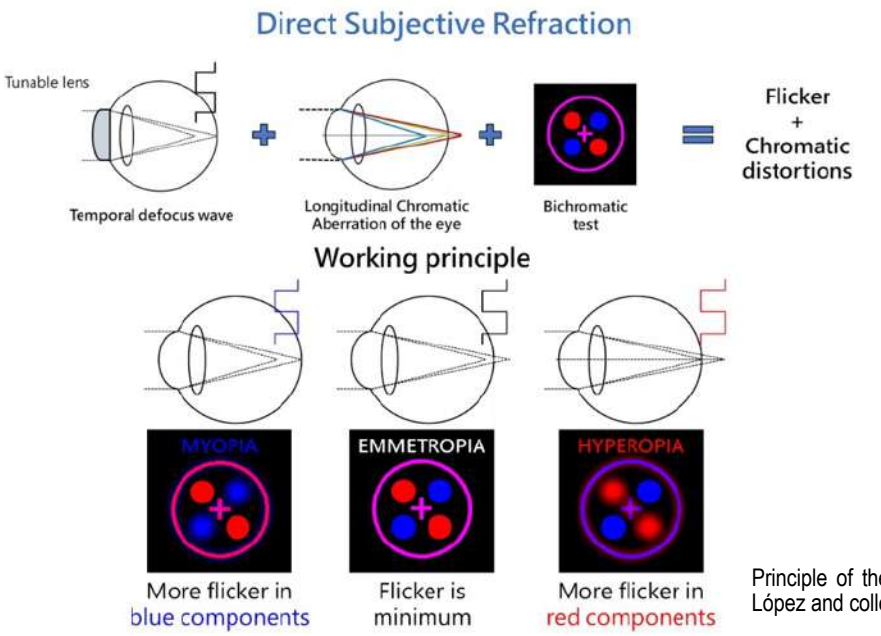
His research addresses a deceptively simple question: how does the human visual system perceive blur, and how can that perception be measured and corrected? Working at the intersection of visual optics, psychophysics and clinical science, he builds both the experiments and the instruments needed to answer it.

His best-known contribution is a new way of measuring refractive error. Using temporal defocus waves—rapid, controlled changes in optical power—he and his colleagues developed the Direct Subjective Refraction, a procedure that is faster and more accurate than the method clinicians have relied on for over two centuries [1–3]. The approach has since moved from the laboratory toward the clinic.

A second line of his work concerns binocular vision. In a continuous collaboration with Johannes Burge at the University of Pennsylvania, he characterized the reverse Pulfrich effect, an optical illusion that distorts depth per-ception in people wearing monovision corrections for presbyopia [4–6]. He then co-developed anti-Pulfrich corrections that cancel the illusion, a result with direct relevance for how presbyopia is corrected with contact lenses and after cataract surgery.

He holds five patent families, most of them licensed, and has secured more than one million euros in competitive funding as principal investigator in four years. In 2024 he founded SureVision Tech, an IO-CSIC spin-off that turns his refraction research into clinically useful technology, and he continues to lead it as manager.

His honors include selection as an MIT Innovator Under 35 Europe, election as a Fellow of the American Academy of Optometry, the Justiniano Casas Best PhD Thesis Award of the Spanish Society of Optics, the CSIC Entrepreneurship and Technology Transfer Award, the Photonics21 Innovator Award and inclusion in the Nova 111 list of leading talent in Spain under 35.



Principle of the Direct Subjective Refraction developed by Dr. Rodríguez López and colleagues to distinguish myopia, emmetropia and hyperopia.

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ICO VP Prof. Yaseera Ismail chairs the Early Career Scientist Prize in Optics Medal Committee

Galileo Galilei Medal for Switchable Meta-Optics

Ultrathin optical surfaces enable new ways to structure, switch, and focus light.



Prof. Muhammad Qasim Mehmood is a tenured professor and Chairperson of Electrical Engineering at Information Technology University (ITU), Lahore, Pakistan.

The International Commission for Optics has awarded Prof. Muhammad Qasim Mehmood the 2026 Galileo Galilei Medal for "the development of dynamic and switchable visible-light metasurfaces for complex light structuring under difficult circumstances." His research explores how nanoscale optical elements can manipulate light's phase, amplitude and polarization within flat, compact devices.

Early work combined a lens and a spiral-phase plate in an ultrathin metasurface, experimentally producing three distinct focused optical vortices at 632.8 nm whose real and virtual focal planes switch with the handedness of circular polarization [1]. Later, his team demonstrated a visible-light tri-channel meta-display: a single-nanoresonator design encoded two polarization-selective far-field holograms and a near-field grayscale image [2]. These studies show how compact optical surfaces can engineer phase, amplitude and polarization together.

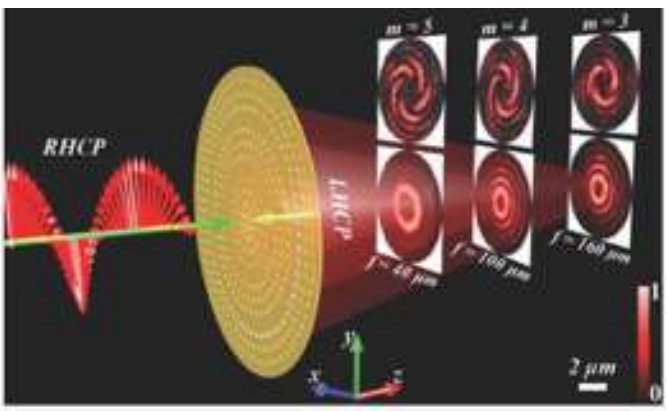
More recently, the "twin-lever" metalens combines achromatic bright-field focusing and vortex-assisted edge-enhanced imaging in a single planar element. Circular polarization selects the output mode, with performance demonstrated across 488–633 nm [3]. The MetaScope platform extends this philosophy to microscopy: a broadband, polarization-selective metalens supports bright-field, edge-enhanced and wide-field-of-view imaging with a resolution of 3.91 μm [4]. For miniature spectroscopy, an experimentally demonstrated silicon-nitride metasurface uses spatially separated focal spots to read out both wavelength and circular-polarization state; a fabricated 1.5 × 1.5 mm² device was validated at ultraviolet–visible wavelengths between 320 and 450 nm [5]. A complementary study moves to near-infrared optical wireless communications with a polarization-insensitive, fluid-induced reconfigurable metalens operating at 1550 nm in three surrounding media, showing controllable focal-length changes [6]. Together, these advances connect structured-light physics to compact imaging, analytical instrumentation and adaptable photonic communication systems.

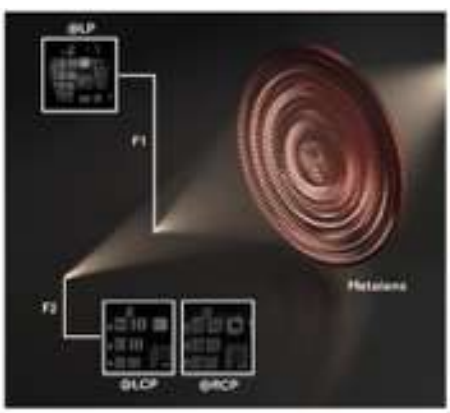
An SPIE Fellow and IEEE Senior Member, Prof. Mehmood earned his PhD from the National University of Singapore in 2016. His earlier awards include the ICO/ICTP Gallieno Denardo Medal (2023) and Pakistan's HEC Best Young Researcher (2024).

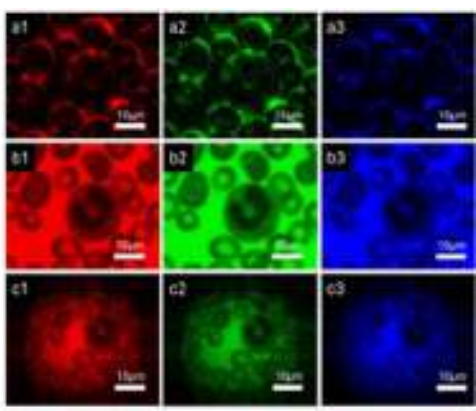
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ICO VP Prof. Andrey Naumov chairs the ICO Galileo Galilei Medal Award Committee







Dynamic and switchable metasurfaces: optical vortex generation, polarization-controlled focusing, multifunctional imaging, spectroscopy and reconfigurable metalenses for optical wireless communications.

The ICTP Promotes Physics Without Frontiers

Special thanks for support are given to ICO, Optica, SPIE, IEEE Photonics and the Abdus Salam ICTP.



Students from Swabi Women University participating in PWF Pakistan Workshop.

In Pakistan, the Active Learning in Optics (ALO) Group, together with ICTP Physics Without Frontiers (PWF), the Optica Student Chapter and the ICO Territorial Committee of Pakistan, all based at the Department of Physics of Quaid-i-Azam University (QAU), Islamabad, organized a series of activities in 2026, coordinated by Dr. Imrana Ashraf, ICTP Institute Associate. The project focused on women's universities in remote areas of Khyber Pakhtunkhwa (KPK), which have limited access to fields such as quantum optics.

The first school took place from 30 March to 2 April 2026 at Women University Mardan, with PWF organizer Natasa Stojic (ICTP) and local organizer Dr. Ambreen Ayub. Prof. Joe Niemela (ICTP) gave a special talk on science and being a scientist. Prof. John Dudley (Université Marie et Louis Pasteur) spoke on light, lasers and the Nobel Prize. Dr. Amal Kasry (UNESCO) addressed science for sustainable development.

To celebrate the International Day of Light, an Optics Fair was planned for 170 students from three institutions in Islamabad, Rawalpindi and Wah Cantt. After a talk on light and light-based technologies, demonstrations covered light sources, scattering, lenses and mirrors, and vision correction. They also covered reflection, refraction and total internal reflection, with experiments such as the swapping arrow and mirages. A follow-up to the Mardan school gave students from Women University Mardan access to apparatus that could not be transported during the first visit. Raja Sanwal presented laser applications in medicine, space exploration and engineering. Hands-on sessions followed in Michelson and Mach-Zehnder interferometry and Fourier optics. A visit to the Atomic and Laser Physics Lab at QAU introduced the students to several laser-based techniques.

Dr. Imrana Ashraf represents the ICO Pakistan Territory



Undergraduate Students from the Federal Government Post-Graduate College for Women, Wah Cantt on International Day of Light.

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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 2027
XXVII ICO General Meeting and World Congress
Beijing, China
Contact: Prof. Yidong Huang
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