



NEWSLETTER

COMMISSION INTERNATIONALE D'OPTIQUE • INTERNATIONAL COMMISSION FOR OPTICS

A STORY FROM RAGS TO RICHES

Dr. Jehan Akbar could not get funding for establishment of laboratories yet he managed to sustain his struggle in a very difficult environment.



Jehan Akbar is working as Assistant Professor of Physics at Hazara University¹ Mansehra, KPK, Pakistan. His research work is mainly related to development of fiber lasers, semiconductor optical amplifiers, high power mode locked lasers and lasers spectroscopy.

Dr. Jehan Akbar completed MSc in Physics in 2007 from University of Peshawar, Pakistan and PhD from the University of Glasgow, UK in 2012 under the supervision of Prof. Anthony E. Kelly and Prof. Catrina Coleman. During his PhD, Dr Akbar designed and fabricated a 40 GHz semiconductor mode locked laser monolithically integrated with distributed Bragg reflector (DBR) and semiconductor optical amplifier (SOA), producing an average output power of 200 mW and peak power of 1.15W. Furthermore, he designed and fabricated a novel monolithic device for adjustable gain clamping in SOAs.

After successful completion of PhD studies at University of Glasgow, Dr. Jehan rejoined Hazara University Mansehra, where he started looking for research collaborations in Pakistan and funding for the establishment of optical and photonics laboratories at Hazara University Mansehra. Although unfortunately he could not get funding for establishment of laboratories yet he managed to sustain his struggle in a very difficult environment.

He quit Pakistan during breaks and summer vacations and worked on research projects on international forums, mainly at ICTP, Italy and collaborated back in Pakistan. This helped him develop a partially sustainable research environment in his parent teaching institute. In response to his untiring efforts for the research and development, Dr. Jehan became an ICTP

Junior Associate in 2015. He is a recipient of the ICO-ICTP Gallieno Denardo Prize in 2016 and a frequent collaborator in Pakistan for outreach activities in universities and high schools, taking advantage of educational kits sent by ICTP, SPIE and OSA.

To acknowledge his efforts for promotion of optics and photonics in Pakistan, a research grant 30,000 USD was awarded by Higher Education Department, KPK Province. The senate of Pakistan standing committee for Science and technology also acknowledged his efforts and invited him for a briefing on present status of research and development activities and to formulate future line of action on part of the Government. In order to acknowledge his efforts, he was presented with a special mention by the Senate standing committee in Pakistan last year.

Currently, Dr. Akbar is Assistant Professor of Physics at Hazara University¹ Mansehra, KPK, Pakistan. His research work is mainly related to development of fiber lasers, semiconductor optical amplifiers, high power mode locked lasers and lasers spectroscopy. His diverse research activities have led to high-impact publications and to new research directions followed by other researchers in Pakistan and worldwide. He is an excellent example of how international cooperation in combination with hard work and talent allows science to flourish under adverse circumstances.



Dr Jehan Akbar Receiving a mention from Chairman Senate standing committee for Science and Technology, Pakistan.

Gallieno Denardo award shared by M. Faryad

His research is focused on the interaction of light with anisotropic materials.



Dr. Faryad worked as a post-doc scholar in the Pennsylvania State University for two years before returning to join as a physics faculty member in the Lahore University of Management Science (LUMS), Pakistan, in 2014, where he has been working since then.

Dr. Muhammad Faryad's shared the ICO-ICTP Gallieno Denardo award 2019 "for his contributions to the understanding of light interaction with nanostructured materials, and applications in the area of optical surface waves, solar cells, optical metamaterials and the modelling of wave propagation in the nanostructured mediums".

He has significantly contributed to the optics of cylindrical reflectors, surface plasmonics with nanoengineered thin films, plasmonic and nanostructured solar cells, Tamm and Dyakonov–Tamm surface waves, plasmonic optical sensors, design and properties of zero-index mediums, optics of one-dimensional dielectric-magnetic photonic crystals, and a recent book on dyadic Green functions for bianisotropic mediums.

One of the major contribution of Dr. Faryad in surface plasmonics is the work on multiple surface-plasmon-polariton (SPP) waves periodically supported by nonhomogeneous materials that show that multiple SPP waves of the same frequency but different polarization states, degrees of localization to the interface, and phase speeds can exist. The applications of these multiple SPP waves in optical sensors have opened up the possibility of more reliable sensors that sense with multiple SPP waves instead of only one.

Dr. Faryad is also an active member of optics community. He is a section editor of a respected archival journal, *Optik-International Journal of Light and Electron Optics*, for the last three years. He has recently been elevated to the senior membership of SPIE. He has conducted several workshop on optics in Pakistani universities for graduate students on plasmonic solar cells, optics of anisotropic media, and optical sensors.

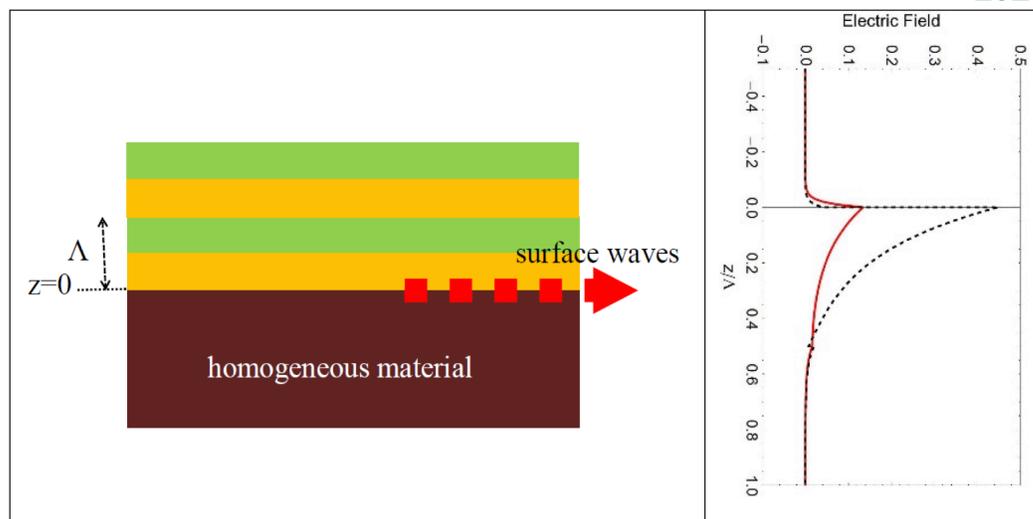
Dr. Muhammad Faryad obtained his BSc in physics and mathematics from the Punjab University, Pakistan, in 2002, and his MSc and MPhil, both in electronics, from the Quaid-i-Azam University, Pakistan, in 2006 and 2008, respectively. His MPhil dissertation was supervised by Prof. Qaisar Naqvi. He obtained his PhD in engineering science and mechanics from the Pennsylvania State University, USA, in 2012 while working under the supervision of Prof. Akhlesh Lakhtakia.

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Prof. Mourad Zghal
Chaired the committee for the
ICO-ICTP Gallieno Denardo Award
2019

Schematic (left) showing propagation of surface waves guided by a homogeneous material and a one-dimensional photonic crystal. The magnitudes of components of the electric field of the surface wave (right) show that the wave is strongly localized to the interface between homogeneous material and the photonic crystal. Figure adapted from Ref. [1].



Christian T. Schmiegelow shares ICTP Award

Dr. Schmiegelow, is now professor at the University of Buenos Aires, and researcher at the Argentinian National Research Council (CONICET).

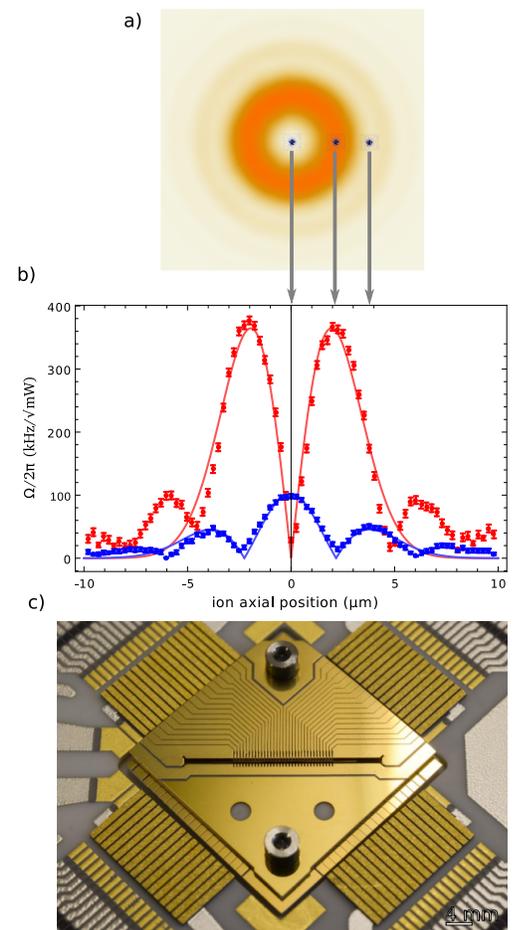


Christian T. Schmiegelow heads the Laboratory for Cold Ions and Atoms (LIAF), where he will continue his work on the structured beams and their applications to spectroscopy and metrology.

Christian Tomás Schmiegelow works on experimental quantum optics. More concretely, on single quantum systems such as a single photons or single atoms in the quest of understanding new physics and realizing applications. Both single photons and trapped atoms are platforms on which quantum computing and quantum information transmission are being developed. These paramount tasks require delicate control of quantum systems and a detailed understanding of the way light and matter interact.

Dr. Schmiegelow and his colleagues demonstrated that special kinds of structured light beams interact with matter in a very particular way. The beams we are talking about are twisted beams, also called chiral beams or beams with orbital angular momentum. These beams, whose intensity profile looks like a donut, can carry arbitrarily large amounts of angular momentum. The angular momentum of each photon is not just given by the circularity of the polarization, but is now also determined by the spatial structure of the beam. What Schmiegelow first predicted [Eur. Phys. J. D 66, 1–9 (2012)] and then demonstrated experimentally [Nat. Comm. 7, 12998 (2016)] is that this extra angular momentum on the photon can be transferred to a single trapped ion. More specifically to the internal motion of the electron around the nucleus. In other words, the extra angular momentum modifies the conventional transition-selection rules, which now have to account for this extra twist.

Dr. Schmiegelow, is now professor at the University of Buenos Aires, and researcher at the Argentinian National Research Council (CONICET). He heads the Laboratory for Cold Ions and Atoms (LIAF), where he will continue his work on the structured beams and their applications to spectroscopy and metrology. He also peruses an old passion: the study of the limits of quantum systems and their transition to classical systems by experiments in which a controlled number of trapped ions can be used as a quantum simulator to understand how thermodynamics works at a quantum level. For the demonstration of transfer of optical orbital momentum to bound electrons and studies on interaction of twisted light with trapped ion, Dr. Schmiegelow has been awarded the Gallieno Denardo Award 2019 together with Muhammad Faryad of Lahore University.



a) Sketch. The intensity profile of twisted beam with orbital angular momentum is shown with images of ions superposed at different positions. In an experiment, the ion is moved along the beam and the excitation strength is recorded.

b) Beam profile measurement. As the ion moves along the beam the interaction strength is measured as a Rabi frequency. Taking into account the full angular momentum of the photon, red indicates the allowed transition, blue the forbidden. For the allowed transition, the ion gets excited in the center of the beam. At that point, the atom takes two quanta of angular momenta from the light field, one from the polarization the other from the structure of the beam.

c) Image of the linear-structured ion trap used to measure the transfer of orbital angular momentum from a light beam to a trapped ion. The structured electrodes allow moving the ion along the beam.

Prof. Mourad Zghal
Chaired the committee for the
ICO-ICTP Gallieno Denardo Award
2019

ICO Mourns passing of Prof. Ramón Corbalán

Prof. Ramón Corbalán from the Autonomous University of Barcelona, was a pioneer of quantum optics in Spain.



Ramón Corbalán, one of the founders of quantum optics in Spain, died on March 2019. He started his career as Assistant Professor of Optics at the Faculty of Sciences of the University of Zaragoza (1969-1975) and joined as an Associate Professor in the Department of Fundamental Physics of the Autonomous University of Barcelona in 1975, a position he held until 1982. That same year he acceded to the Chair of Optics of the Faculty of Physics of the University of Seville, which he held until 1987, when he joined the UAB again as Professor of the Optics Group of the Department of Physics. He was director of the Department of Physics of the UAB from 1990 to 1994.

His research focused on fields such as quantum optics, nonlinear optics and lasers dynamics, and

the physics of ultracold atoms. He developed an extensive academic career with numerous publications among which stands out his theory of "lasing without inversion" (Journal of Optics B: Quantum and Semiclassical Optics 2 (3), R7) and was the coordinator of the commission "Physics and Space Sciences" of the Spanish National Agency for Evaluation and Prospective from 2010 till 2013.

He was also an active member of the Spanish optical community and belonged to the leaders that promoted the establishment of the series of Spanish National Meeting on Optics (RNO). He was also the first president of the Quantum and Nonlinear Optics Committee of the Spanish Optical Society (SEDPTICA).

ICO joins the Spanish optical community in this sad moment.

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Forthcoming events with ICO participation

Below is a list of 2019 events with ICO participation. For further information, visit the new ICO web at <http://e-ico.org/node/103>.

21–24 May 2019

ETOP2019: Education and training in Optics and Photonics

Quebec City, Canada
Contact: Pierre Bolduc
tel: +418 5228182
Pierre.bolduc@conferium.com
etop2019.copl.ulaval.ca

4–7 September 2019

Optisud: ICO-IUPAP-C17 Meeting on Optics & Applications to Sustainable Development

Carthage, Tunisia
Contact: Prof. Mourad Zghal
tel: +216 20202020
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31 May–4 June 2019

4th International Conference on Applications of Optics and Photonics

Lisbon, Portugal
Contact: Manuel Costa
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aop2019@optica.pt
www.aop2019.org

23–27 September 2019

RIAO-OPTILAS-MOPM 2019 Iberoamerican optics meeting

Cancún, Mexico
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