

Commission C15: Atomic, Molecular and Optical Physics

Report (November 2020 – October 2021) to the IUPAP Executive Council & Commission Chairs meeting.

Submitted by Roberto Rivarola (Chair)

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C15 Activities:

The major activities from November 2020 to October 2021 are categorized into the following items.

1. IUPAP C15 Young Scientist Prize

As it was informed in our previous report, Dr. Philippe Hauke, from the University of Trento, in Italy, was selected to receive the IUPAP Young Scientist Prize in Atomic, Molecular, and Optical Physics, corresponding to the year 2020 “*For his outstanding contributions to the development of quantum technologies based on Atomic, Molecular and Optical systems, ranging from quantum annealing, over quantum metrology, to quantum simulations of strongly-correlated condensed-matter systems and lattice gauge theories.*” The award was planned to be presented during the International Conference on Atomic Physics (ICAP-27) in Toronto, Canada, on July 2020. However, this conference was postponed for two years to July 2022, due to the pandemic and thus he presented his award lecture during the virtual XXXII International

Conference on Photonic, Electronic and Atomic Collisions (ViCPEAC 2021), which was held in July 2021. The YSP C15 diploma and the medal were sent to the laureate by a private courier.

Dr. Carlos Hernández- García, from Universidad de Salamanca, in Spain, was selected among 37 candidates to receive the IUPAP Young Scientist Prize in Atomic, Molecular and Optical Physics 2021 “*For his contributions to the theory and modeling of laser-driven high harmonic generation (HHG), both in high photon energy regimes, and in understanding how to manipulate the HHG waveforms to impart orbital and spin photon angular momentum, combining quantum simulations with laser Physics*”. He received his PhD at the Universidad de Salamanca. Right afterwards, he was granted with an European Marie Curie International Fellowship, where he worked with the theoretical and experimental AMO groups at JILA, University of Colorado at Boulder (USA). He is at present a Ramon and Cajal fellow at the Universidad de Salamanca, where he leads the ERC Starting Grand Project ATTOSTRUCTURA in the Research Group of Laser and Photonic Applications (ALF-USAL). Carlos Hernández-García is renowned for his theoretical contribution to attosecond science and ultrafast nonlinear optics. His theoretical work on strong-field laser physics has been strongly connected to experimental laser and X-ray science. He has developed original models that extended the computational capabilities to the most stringent situations encountered in the state-of-the-art experiments. He has actively participated in the development of ultrafast structured light, with notable achievements that paved the way for the experimental demonstration of circularly polarized high-harmonic attosecond pulses, ultrafast vector beams, and EUV/soft x-ray harmonic pulses with controlled orbital angular momentum, among others. He had a key contribution for the development of a new class of light beams possessing time-dependent orbital angular momentum or self-torque. These breakthroughs have enabled the practical implementation of a novel class of laser-driven coherent X-ray sources structured in their spectral, temporal and angular momentum properties. He also presented his award lecture during the virtual XXXII International Conference on Photonic, Electronic and Atomic Collisions (ViCPEAC 2021), which was held in July 2021.

2. Conference Support

The following C15 conferences were planned to be developed with IUPAP support in 2020:

- Type- A conference:

The 27th International Conference on Atomic Physics

Location: Toronto, Canada.

Date: July 20th -24th, 2020 – Postponed to July 2022 due to the pandemic.

Local Chair: Prof. Joseph Thywissen, University of Toronto, Canada

“The financial support was received by the organizers and it will be used for the 2022 version of the conference.”

- Type –B Conference:

20th International Conference on Highly Charged Ions

Location: Matsue, Japan

Date: September 07th – 11th, 2020 – Postponed to August-September 2022 due to the pandemic.

Local Chair: Hajime Tanuma

The following C15 conference was held with IUPAP support in 2021:

- Type- A conference:

The 32nd International Conference on Photonic, Electronic and Atomic Collisions –

Date: July 20th -23rd, 2021 – in virtual format (<https://www.icpeac2021.ca/>).

Local Chair: Till Jahnke

3. Some activities developed by Commission C15.

- A list of C15 proposed new members was sent to IUPAP authorities on August 2021. The members were selected considering an adequate gender balance, as well as the inclusion of the different research themes corresponding to the two main C-15 conferences (ICAP and ICPEAC) and the representation of scientists from different continents.
- A virtual C15 meeting was held on 16 September 2021, where all activities developed by the commission members during the 2020-2021 years were reviewed. The necessity to increase the participation of women in IUPAP Commissions, in YSP nominations as well as in Scientific and Organizing Committees of conferences was the subject of a lively discussion. The increasing of women percentage as invited speakers in conferences was also considered.

Other activities:

The C15-Vicechair participated of a virtual meeting in July, 2021 on a “Pre-meeting on draft agenda and new internal regulations for the 30th General Assembly.

Future schedule:

1. The following conferences C15 conferences will be held with IUPAP support in 2022:

- Type- A conference:
The 27th International Conference on Atomic Physics
 Location: Toronto, Canada.
 Date: July 17th to 22nd, 2022.
 Local Chair: Prof. Joseph Thywissen, University of Toronto, Canada.
Funds already received
 - Type –B Conference:
20th International Conference on Highly Charged Ions
 Location: Matsue, Japan
 Date: August 29th to September 3rd, 2022.
 Local Chair: Hajime Tanuma
Funds not received
 - Type-B conference
A new presentation for IUPAP support: ATTO VIII: 8th International Conference on Attosecond Science and Technology,
 Date: July 11th to 15th July, 2022.
 Location: Orlando, USA.
 Local Chair: Luca Argenti
2. About the YSP prize it must be mentioned that it has been awarded annually alternating between the two major “flagship” conferences of the AMO Physics field regularly supported by IUPAP, ICPEAC (International Conference on Photonic, Electronic, and Atomic Collisions) or ICAP (International Conference on Atomic Physics). At the beginning of next year, the C15 commission will start with the process of selection of the 2022 YSP. It is planned that the YSP winner, following the tradition, will give a lecture at the 27th Conference on Atomic Physics to be held in 2022 in Toronto, Canada, and will receive a medal and a certificate at the banquet of the conference. Also, a check of 1,000 Euros will be sent to the awarded.
 3. The members of the C15 have accepted to serve one more year given the global pandemic situation, considering that the IUPAP General Assembly was postponed to October 2021.