

Commission C15: Atomic, Molecular and Optical Physics

Report (November 2018 – October 2019) to the IUPAP Council & Commission Chairs meeting

Submitted by Roberto Rivarola (Chair)

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C15 Activities:

The major activities from November 2018 to October 2019 are categorized into the following items.

1. IUPAP C15 Young Scientist Prize

The IUPAP Young Scientist Prize in Atomic, Molecular, and Optical (AMO) Physics, corresponding to the year 2019, was presented during the “XXXIst International Conference on Photonic, Electronic and Atomic Collisions (ICPEAC 2109) held in Deauville, France from July 23rd – 30th, 2019”. Two scientists were selected by the Commission C15, Andreas Mooser and Christian Smorra.

Andreas Mooser received his Ph.D. in 2014 from the Johannes Gutenberg-University of Mainz, Germany, for the first direct observation of single spin-transitions and the first direct high-precision measurement of the nuclear magnetic moment of a single proton. Afterwards he obtained a RIKEN FPR fellowship to join the BASE collaboration at CERN. Here he performed high-precision measurements of the fundamental properties of single protons and antiprotons, which culminated in precise tests of the CPT symmetry with protons and antiprotons. In parallel, he worked on the implementation of sympathetic laser cooling in Penning traps at the BASE-Mainz

experiment and, together with researchers from the Max-Planck Institute for Nuclear Physics, Heidelberg, Germany, conducted the most precise measurement of the atomic mass of the proton. Since 2018, he joined this institute.

Christian Smorra graduated as PhD student in 2012 at the Ruprecht-Karls-University Heidelberg. As part of the “Cooled and Stored Ions Division” of the Max-Planck-Institute for Nuclear Physics, he measured the energy release of double-electron capture transitions with high precision using Penning trap mass spectrometry techniques. As a RIKEN postdoctoral researcher, he also joined the BASE collaboration at CERN to construct a new Penning-trap system for high-precision tests of CPT invariance with antiprotons. Here, he contributed to the development of the antiproton reservoir trap and to the most precise charge-to-mass ratio comparison of protons and antiprotons. Currently, he is working at RIKEN on new methods to increase the sensitivity of low-energy antiproton measurements.

The prize was awarded for their outstanding contributions to determine the most precise comparison of the proton-to-antiproton charge-to-mass ratios and the most precise comparison of the proton and antiproton magnetic moments, constituting two different world-record tests of the fundamental charge, parity, and time reversal symmetry in these systems.”

We should mention that a total of 38 eligible candidates of very high scientific level, from all around the world, has been nominated for the prize.

2. Conference Support

The following conference was supported by IUPAP in 2019:

Type- A conference:

XXXIst International Conference on Photonic, Electronic and Atomic Collisions

Location: Deauville, Normandy, France

Date: July 23rd -30th, 2019

Local Chair: Dominique Vernhet, Institut de NanoSciences de Paris, France

3. The presence of IUPAP in ICPEAC 2019

IUPAP had a relevant presence in ICPEAC 2019, with its participation in different activities.

- During all the conference, in the entrance hall of the “Centre International de Deauville”, the venue of the event, a banner describing the numerous activities developed by IUPAP was exhibited.

- A dedicated banner has been printed by the local ICPEAC 2019 organizers and displayed during the whole conference on the stage of the main auditorium.
- The New IUPAP Policy on harassment has been applied by the ICPEAC 2019 Chair and in that respect Danielle Dowek (Co-chair of ICPEAC 2019) has been named as advisor who consults with those who can possibly suffered from harassment and Lamri Adoui (Co-chair of ICPEAC 2019) has been named as advisor who consults those accused of harassment. All participants at ICPEAC 2019 have enjoyed a comfortable experience and no case of harassment has been recorded.
- On Friday July 26th, a meeting of the C15 took place with members attending ICPEAC 2019. The Chair of the Local Organizing Committee and at same time Vice-chair of IUPAP C15 Commission, Dr. Dominique Vernhet as well as the ICPEAC Scientific Secretary, participated of the meeting. Different items considered in the C&CC meetings hold in Singapore and Lithuania were discussed, in particular on the conditions and rules applied for the organization of future conferences, with emphasis on the necessity to increase the women participation as invited speakers and in Advisory, Program and Local Committees. Furthermore, it was commented that the gender subject should be considered in the future selection of IUPAP Commission Chairs and Officers. The C15 Chair expressed that applications of type B conferences for IUPAP support are welcome in years where only one C15 conference is held. The ICPEAC 2019 Chair gave a report informing on how the IUPAP support was used for the conference.
- On Monday July 29th, Dr. Christian Smorra, one of the above mentioned 2019 IUPAP YSP winners, gave a lecture on behave of the two awardees, after a brief introduction of the YSP 2019 winners by the C15 Chair.
- Also on Monday July 29th, as a part of the conference dinner medals and a certificates were offered by the C15 Chair and Vicechair to Christian Smorra, in the name of both YSP 2019 winners. Each one of the awardees received an amount of 1,000 euros before this date.

Other activities:

- A one page document was produced succinctly illustrating the C15-mission, achievements and future plans. Such a page would be used to produce flyers to be distributed to participants in IUPAP-sponsored conferences relevant to the field of the Commission/Working Group.
- IUPAP is promoting various initiatives to publicise the activities of the Union also in preparation of the Centenary celebrations. A new Working Group on the Centenary was established, WG17. A member of the C15-Commission was proposed to integrate WG17.

Future schedule:

- Two applications for IUPAP support were received before June 1st 2019:
Type-A conference: 27th International Conference on Atomic Physics (ICAP 2020)
Location: Toronto, Canada
Date: July 19th -25th, 2020
Local Chair: Joseph Thywissen, University of Toronto, Canada

Type-B conference: 20th International Conference on the Physics of Highly Charged Ions (HCI 2020)
Locations Matsue, Shimane, Japan
Date: September 7th – 11th, 2020
Local Chair: Hajime Tanuma, Tokyo Metropolitan University, Tokyo, Japan
- The YSP prize 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 2020 YSP. It is planned that the YSP winner, following the tradition, will give a lecture at the 27th International Conference on Atomic Physics to be held in Toronto 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.