

COMMISSION B5

LABORATORY ASTROPHYSICS

ASTROPHYSIQUE DE LABORATOIRE

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COMMISSION B5 WORKING GROUPS

Commission 5 WG
Commission 5 WG

High-Accuracy Stellar Spectroscopy
Spectroscopic and Radiative Data for Molecules

TRIENNIAL REPORT 2015-2018

1. Introduction

The purpose of the Laboratory Astrophysics Commission (B5) is to address the multidisciplinary needs and requirements of modern astronomy and planetary science. As a result, the Commission encompasses the fundamental research areas that generate astrophysical data needs: atomic and molecular astrophysics, physics and chemistry of dust grains and ices (solid materials and condensed matter), plasma astrophysics, and nuclear and particle astrophysics. The Commission embraces and promotes interdisciplinary studies crossing physical, chemical, biological, geological sciences of relevance to astronomy, including experiment, theory, and modeling, from the nuclear and atomic/molecular level to application on astronomical scales.

In summary, the Laboratory Astrophysics Commission is a strongly cross-disciplinary commission that was created to reinforce the active synergy between astronomical observation, laboratory experiment and theoretical modeling. The Commission assists and supports all IAU members by providing the data needed to interpret and understand astronomical observations, guide new astronomical observations and promotes Laboratory Astrophysics.

2. Developments within the past triennium

The Commission came into being at the IAU 29th General Assembly Meeting in Hawaii in 2015 as a natural successor of Commission 14 (Atomic and Molecular Data) and in recognition of the ever expanding multidisciplinary needs of the astronomical community.

Commission B5 has 139 Members, including astronomers, astrophysicists, astrochemists and astrobiologists and has established two working groups, one on High-Accuracy Stellar Spectroscopy and a second on Spectroscopic and Radiative Data for Molecules.

Communication

Commission B5 has had the policy of being open to input from its members and all IAU members at all times following the consultations initiated with the various components of the astronomy and laboratory astrophysics communities before, during and following the founding meeting of the Commission that was held at the IAU General Assembly in Hawaii in 2015.

The founding event was a three-day long Focus Meeting on "Bridging Laboratory Astrophysics and Astronomy" that covered the breadth of the field (Salama, Mashonkina, and Federman (2015)). The meeting discussed the strong interplay between astronomy and astrophysics with theoretical and experimental studies into the underlying atomic, molecular, dust and ices, plasma, planetary science, nuclear and particle physics processes, which drive our Universe.

During the 2015-2018 triennium, the various activities and discussions for the most part took place through email consultation among the Organizing Committee members and, more generally, among the members of the Commission.

The Commission communicated with its members through the IAU mass mailing system (e.g., to inform the members of the Commission about meetings and conferences of interest, announcements of interest such as International research agreements and job opportunities and to publicize events of general interest for the IAU such as elections and membership campaigns).

Working Groups

During the 2015-2018 triennium, the Commission established two working groups:

The first Working Group (WG) established by the Commission, the WG on High-Accuracy Stellar Spectroscopy, was launched in 2016 and promotes targeted efforts within laboratory astrophysics between theoretical atomic physics, laboratory spectroscopy, and astronomical observations for generating high-accuracy atomic and molecular data required for accurate stellar spectroscopy (see the separate report of the WG in this issue).

The second Working Group (WG) established by the Commission, the WG on Spectroscopic and Radiative Data for Molecules, was launched in 2017 and provides reports on the latest experimental and theoretical results on radiative processes for the astronomical community. Radiative processes, especially at ultraviolet, visible, infrared, and millimeter wavelengths, provide essential information on molecular abundances and excitation in astronomical environments (see the separate report of the WG in this issue).

Meetings and Symposia

Commission B5 has endorsed a proposal for a Symposium at IAU 2018 and a proposal for a Focus Meeting at IAU 2018.

The OC of Commission B5 has submitted a proposal to organize and hold the first IAU Laboratory Astrophysics Symposium as a non-GA IAU Symposium in 2019.

The proposed Symposium is entitled: "Laboratory Astrophysics: from Observations to Interpretation. The SOC of the proposed Symposium is composed of the members of the organizing committee of the commission (Paul Barklem, Helen Fraser, Thomas Henning, Harold Linnartz, Farid Salama (Chair) , Gianfranco Vidali and Feilu Wang), members of the commission (Christine Joblin, Osama Shalabiea), as well as representatives of Division F (Sun Kwok for Commission F3), Division H (Tom Millar for Commission H2), and Division E (Giulio Del-Zanna).

Commission B5 seeks connections with other IAU Divisions and Commissions.

The President of the commission was a member of the SOC of IAU S332, Astrochemistry VII Through the Cosmos from Galaxies to Planets, organized by the Astrochemistry Commission (Commission H2) that was held in Puerto Varas, Chili in March 2017.

The President of the Astrochemistry Commission CH2 (Millar) and the President of the Astrobiology Commission CF3 (Kwok) are members of the SOC of the non-GA IAU Symposium Laboratory Astrophysics: from Observations to Interpretation proposed by Commission B5 for 2019.

The President of the commission is a member of the SOC for the Focus Meeting Nano Dust in Space and Astrophysics, FM10, to be held at the IAU 2018 GA by Commission E3, Solar Impact Throughout the Heliosphere.

3. Closing remarks

The future of Laboratory Astrophysics depends crucially on the recognition by the astronomical community of the essential role that this multidisciplinary field plays in the support and the validation of astronomical data analysis. A long-term support and investment into this discipline is required. The advent of new technologies and the impact of new optics and detectors on the quality of the data returned from ground-, space- and airborne observatories have increased the role played by laboratory astrophysics in the past decades.

The plans for the Organizing Committee and the members of the commission in the near future are to:

- continue to advocate for laboratory astrophysics among the science community (astronomy, physics, chemistry and biology). This will be achieved through the advertising of the Commission at the various astronomy, physics, chemistry and biology meetings attended by its members.

- continue to grow the current membership by attracting new members from the astronomy, physics, chemistry and biology communities. This objective too will be achieved through the attendance of science meetings of the target science communities.

- organize science meetings (ideally one per triennium, either during or outside the IAU General Assembly) to bring together the international laboratory astrophysics community to discuss the major topics and challenges that face Astronomy. The objectives being to enhance the interaction and the collaboration between national laboratory astrophysics societies and communities and derive a solid roadmap for future research that will lead to advances in our understanding of astronomical observations and guide the design of future observational instruments.

- encourage and support the establishment of new working groups as required with the continuous evolution of this multidisciplinary field

- actively pursue the work initiated during this first triennium toward improved outreach to the various and diverse research communities that pursue laboratory astrophysics research including the promotion of collaboration with under represented groups in the developing world.

Farid Salama
president of the Commission

References

Salama, F., Mashonkina, L. & Federman, S. 2015, in: *FM12: A Focus Meeting on Bridging Laboratory Astrophysics and Astronomy*, Proceedings International Astronomical Union, Volume 11, Issue A29A (Astronomy in Focus), pp. 282-352 and references therein. doi: 10.1017/S1743921316003057.