12th INTEGRAL conference and 1st AHEAD gamma-ray workshop
INTEGRAL looks AHEAD to multi-messenger astronomy

*Geneva, February 11-15, 2019*

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# FOREWORD

The INTErnational Gamma-Ray Laboratory (INTEGRAL) is a European Space Observatory launched in October 2002. It has provided an impressive number of breakthrough discoveries of which we mention: the detection of highly obscured X-ray sources in the Galaxy, invisible to other facilities (2003-2018); the unique measurement of gamma-ray lines from a Type Ia supernova (2014); the precise measurement of gamma-ray spectral lines produced by annihilation of positrons and decay of radioactive aluminum (2003-2018); extensive monitoring of the brightest black-hole X-ray binaries (2016); the first and unique detection of a flash of gamma-rays coincident with a gravitational wave originated by the merging of two neutron stars (2017).

After hosting the 1$^{st}$ INTEGRAL workshop in 1993, several Science analysis workshops and a Spring School, the University of Geneva has, in February 2019, organized at the campus Biotech of Geneva (CF), the 12$^{th}$ INTEGRAL conference together with the first AHEAD Gamma-ray workshop. AHEAD is a European Community H2020 program, and one of its goals is enabling the development of future gamma-ray Astrophysics missions.

In August 2017, the dawn of the Multi Messenger Astronomy was marked by the historical combined observation of a gravitational wave signal, a burst of gamma rays, the optical kilonova, and the radio plus X-ray afterglow from a merger of neutron stars in a galaxy at 40 Mpc from us. As evidenced in the conference title “INTEGRAL looks AHEAD to multi-messenger astronomy”, the aim of this meeting was to review the achievements in this raising field. We paired classical and high-energy astronomy with detection of gravitational waves, neutrinos, and the mysterious fast radio bursts. A very rich set of presentations was held during three of the four conference days on this topic. One entire days was dedicated to present future missions and facilities that will allow astronomers to enlarge their discovery space in the future. This was possible owing to the generous contribution of the AHEAD program.

A prestigious Science Organizing committee has put together a remarkable program, including invited and solicited speakers that presented extensive and deep reviews, most of them appearing in this volume. The program has been enriched through many contributed talks, making the conference a remarkably exciting event. Participants to the conference could enjoy talks and posters in a very efficient conference center, easily reachable from the Geneva International airport. Our sponsors permitted us to offer a rarely low conference fee. This has facilitated the participation of a broad international community, comprising over 140 scientists from all over the world.

We warmly thank all our sponsors, the organizing committees, and the city of Geneva for hosting all our community.

We would also like to particularly thank Mrs. Martine Logossou for her passionate and precious support during the entire organization period, as well as during the whole conference. This event would not have been so successfull without her experience and dedication.

The Editor of the proceedings:
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