

Physics at the Magnetospheric Boundary

Geneva (Switzerland)

25-28 June 2013

SCIENTIFIC REPORT

Conference organization and participation

The conference “Physics at the Magnetospheric boundary” took place as planned from 25 to 28 June 2013.

The conference venue was established at the University of Geneva, SCIENCE II building. We made use of the large capacity A150 room, able to host up to 150 persons.

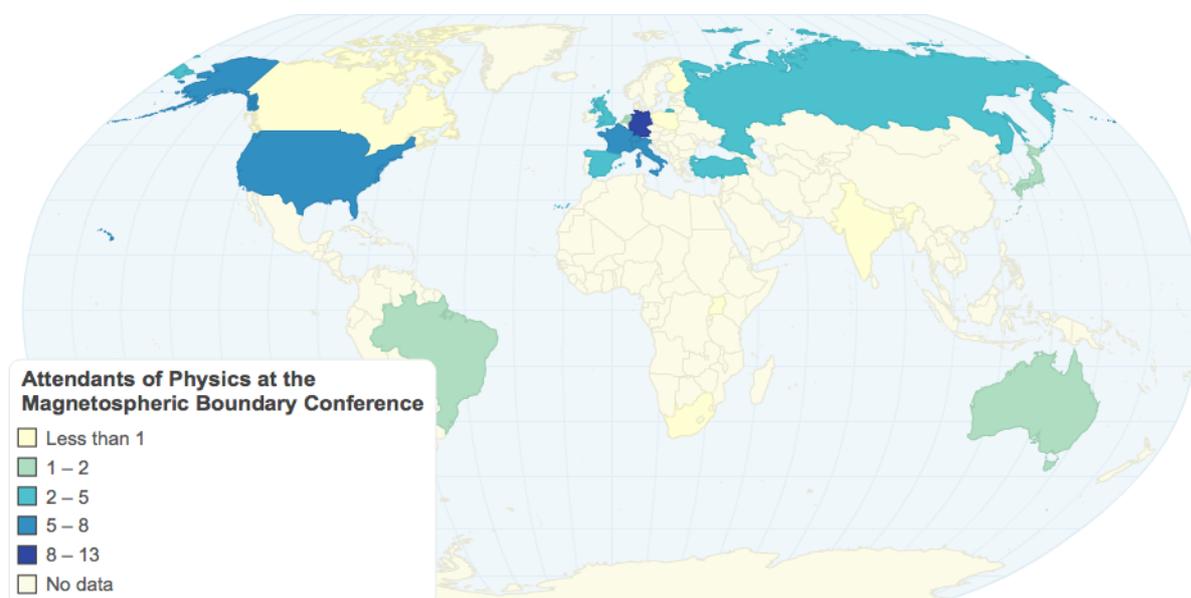
The Local Organizing Committee (LOC) comprised: E. Bozzo, M. Audard, C. Ferrigno, M. Logossou and M. Falanga. All LOC members are based at the ISDC (Department of Astronomy, University of Geneva), the only exception being M. Falanga who is based at the ISSI (Bern).

The Scientific Organizing Committee (SOC) comprised: E. Bozzo (ISDC, Switzerland), P. Kretschmar (ESA/ESAC, Spain); M. Audard (ISDC, Switzerland), J. Bouvier (IPAG, France), N. Calvet (University of Michigan, United States), C. Ferrigno (ISDC, Switzerland), M. Falanga (ISSI Bern, Switzerland), J. Ferreira (IPAG, France), P. Ghosh (TIFR Mumbai, India), L. Hartmann (University of Michigan, United States), C. Hellier (Keele University, United Kingdom), D. Klochkov (University of Tübingen, Germany), I. Kreykenbohm (Dr. Karl Remeis Sternwarte & ECAP, Bamberg, Germany), K. Postnov (Sternberg Astronomical Institute Moscow University, Russia), R. Rothschild (UCSD, United States), M. Romanova (Cornell University, United States), P. Reig (IESL, Greece), A. Santangelo (University of Tübingen, Germany), R. Staubert (University of Tübingen, Germany), L. Stella (INAF-OAR, Italy), M. Vietri (Scuola Normale superior di Pisa, Italy), J. Wilms (Dr. Karl Remeis Sternwarte & ECAP, Bamberg, Germany).

The total number of participants was 73¹, including 1 member of the local organizing committee (taking care of the registration and help desk during the event) and 11 invited speakers (S. Alencar (UFMG, Brazil), J. Bouvier (IPAG, France), C. Hellier (Keele Univ., United Kingdom), D. Lai (Cornell University, United States), R. Pudritz (McMaster University, Canada), M. Romanova (Cornell University, United States), N. Shakura (SAI, Russia), L. Stella (Osservatorio Astronomico di Roma, Italy), D. Wickramasinghe (ANU, Australia), J. Wilms (ECAP, Germany), C. Zanni (Osservatorio Astronomico di Torino, Italy).

A total of eight young students were granted support to participate to the conference and were not requested to pay the conference fee.

The conference was broadly advertised well ahead of the event, making it possible to ensure a wide international participation (see map below).



Geographical distribution of the conference participants.

Scientific topics

The conference was focused on the study of those physical processes that occur at the limit of the magnetically dominated regions around celestial accreting sources, including neutron stars, white dwarfs, and young stellar objects.

Despite the differences between these sources in terms of mass, radius, and formation history, they are all characterized by the presence of a relatively strong magnetic field which regulates the interaction between the stars and their surrounding environment. Depending on the magnetic field strength, ranging for few Gauss in young stellar objects up to billions of Gauss and beyond in strongly magnetized neutron stars, accreting sources are able to affect the motion of plasma at

¹ The full list of participants is available at: <http://www.isdc.unige.ch/magbound/index.php/participants>

different distances around them and channel it toward their magnetic poles. This process gives rise to a conspicuous emission of radiation observable from radio to gamma-ray wavelengths.

It is of particular interest for the modern Astrophysics to understand how the emitted radiation and its intrinsic variations are related to the different coupling mechanisms between the inflowing plasma and the magnetosphere of the accretion source. The region of coupling is generally called “magnetospheric boundary”; here complex instabilities and interactions regulate the way in which the potential and gravitational energy of the accreting material is converted into electromagnetic radiation once it “hits” the stellar surface.

Conference achievements

To efficiently cover the study of the “physics at the magnetospheric boundary” in all considered classes of celestial objects, the conference was conveniently organized into 10 separated sessions. The selected invited and contributed talks ensured a proper theoretical and observational treatment of the different physical phenomena in all considered class of sources. The presence of world-leading experts in numerical simulations provided an optimal summary of our current capability to simulate physical processes at the Magnetospheric boundary, taking advantage of large clusters of computers and magneto-hydrodynamical codes.

For each session, the corresponding invited speaker was requested to summarize the most recent achievements in its own field of expertise and provide an extended introduction to easier the comparison between the same phenomena observed and studied in different astrophysical sources. Each invited talk was followed by 4-6 contributed talks, yielding a more detailed view of a few specific topics mentioned by the invited speaker.

In each session, 20 minutes of open discussion were planned following all talks in order to favour exchanges of ideas and focus the attention on more critical issues. These discussions were really effective in stimulating interactions between the different scientific communities at the conference and were widely well appreciated.

Each session was concluded with poster advertisements. A time slot of about 1 minute was provided to all participants presenting a poster contribution and willing to shortly summarize their findings in front of the audience.

Immediate access to all posters at the end of each session was granted by displaying them for the entire duration of the event in an ample hall just outside the conference room.

A social dinner was organized during the evening of the second day, in order to provide an informal opportunity for the participants to get to know each other. The event contributed in creating a friendly environment and stimulated new international collaborations.

On the last day, the final session of the conference provided to all participants a convenient wrap-up of all main open questions of the physics at the Magnetospheric boundary and the prospects for a fruitful future development of this field of research.

A book of proceedings is in preparation to provide a reference for the future on the discussions that took place during the physics at the Magnetospheric boundary conference and will remain available also on-line for world-wide consultation.

Local scientists at the University of Geneva greatly appreciated the effort of all participants in presenting clearly their results and summarizing the current status of their fields of research. Students passing along the conference hall were attracted by the posters publicly accessible there and contributed to widen the interest for the study of the physics at the Magnetospheric boundary in Geneva.

The conference successfully led to a mix of different communities working on phenomena that are relevant for a very broad range of astronomical sources. It was proposed to organize a follow-up event on the same topic in a two-years timescale.

The personnel of the University of Geneva proved to be extremely collaborative and helpful in planning all details of the event (from coffee breaks to transportation), significantly contributing to its success.

The LOC is particularly grateful to the Société Académique de Genève, the Commission administrative de l'Université de Genève, the Swiss National Science Foundation, the European Astronomical Society, and the European Space Agency for their financial support, without which this event could not have taken place.

Versoix, Switzerland
2013 July 5

Enrico Bozzo
(on behalf of the LOC and SOC)