

Second Circular – Workshop of the International Space Science Institute (ISSI)

15 February 2012

Microphysics of cosmic plasmas

Convenors:

André Balogh (Imperial College London, UK)
Andrei Bykov (Ioffe Physical-Technical Institute, St. Petersburg, Russia),
Peter Cargill (University of St Andrews and Imperial College London, UK),
Richard Dendy (Euratom/UKAEA Fusion Association, UK)
Thierry Dudok de Wit (CNRS/LPC2E, France)
John C. Raymond (Harvard-Smithsonian Center for Astrophysics, USA)

Local organisation: Jennifer Zaugg, ISSI, jennifer.zaugg@issibern.ch
Phone: +41 31 631 48 96, Fax: +41 31 631 48 97

Date: 16 - 20 April 2012

Context: The International Space Science Institute (ISSI) is holding a series of three Workshops on physical processes in cosmic plasmas. The initiative is based on discussions held in an ISSI Forum in March 2009 on the future of magnetospheric research and also subsequently. The objective of the workshops is to broaden the review of space plasma physics to all scales in the Universe. The Workshop on "*Particle acceleration in cosmic plasmas*" was the first to be held on 16 to 20 May 2011. The second Workshop of the series, to be held in ISSI on 16 to 20 April 2012, will cover the "*Microphysics of cosmic plasmas*". The third Workshop, on "*Multi-scale structure formation and dynamics in cosmic plasmas*" is expected to be held in the first half of 2013.

Objectives of the Workshop:

The workshop will address the physical processes that underlie the observed large-scale properties, structures and dynamics of cosmic plasmas, the matter that fills interplanetary, interstellar and intergalactic space, as well as the solar atmosphere and the Earth's magnetosphere. The Workshop will review the status of understanding of microscale processes in all astrophysical collisionless plasmas. In addition, the Workshop will also consider the lessons that can be learned from the extensive existing knowledge of laboratory plasmas.

The Workshop will cover the following main themes:

- Turbulence as a phenomenological description of the properties of plasmas on all scales
 - General description of turbulence phenomena in space plasmas: the turbulent cascade, driving and dissipation processes
 - Plasma turbulence in the solar wind
 - Experimental and theoretical studies of the dissipation in solar system plasmas
 - Turbulence in the solar photosphere, chromosphere and corona
 - Astrophysical turbulence on all scales (Supernovae remnants, interstellar medium, intergalactic medium, accretion processes)
- A review and assessment of microprocesses in plasmas
 - Hierarchies of plasma instabilities
 - Non-local, non-diffusive transport processes in space plasmas, on astrophysical scales and laboratory plasmas
 - Ionisation and radiation processes
- Magnetic reconnection
 - Collisionless reconnection - conceptual problems and solutions
 - Magnetohydrodynamic reconnection
 - Experimental magnetic reconnection in laboratory plasmas
 - Reconnection in solar system plasmas including magnetospheres
 - The role of magnetic reconnection in astrophysical plasmas
- Shock waves in cosmic plasmas
 - Plasma kinetics of shocks
 - 3D structures and shock reformation
 - Interaction of turbulence with non-linear structures and shocks
 - Electron and ion heating at shocks
 - Relativistic shocks
- Techniques of plasma description
 - The study of in situ space plasma distributions
 - Remote sensing of astrophysical plasmas
 - Lessons from laser and laboratory plasmas
- Summaries
 - A number of summaries will be presented on the topics of the Workshop, to synthesise the achievements and identify and formulate remaining or new problems

Product: Following the Workshop, its output will be published as a volume in the Space Science Series of ISSI by Springer, in parallel with the publication of the papers in Space Science Reviews. It is expected that a total of about 15 to 20 review style and quality papers, submitted to the usual refereeing process will be published in the book.

Papers will be based on talks presented at the Workshop and will reflect the discussions that are encouraged to be held among the participants during the Workshop. A realistic schedule for the publication of the contributions will be confirmed at the conclusion of the Workshop, but the deadline is expected to be end of September 2012.

Advice to the speakers

The conveners would like to remind the speakers that ISSI workshops differ in many ways from other, larger gatherings called "workshop". The guiding spirit of the ISSI workshops is interdisciplinarity - contributors are invited from a range of communities to interact during the workshop, so that the broad synthesis of the topics covered can emerge in the published contributions the ISSI volume of the workshop. In your talks we would like you to focus both on the topic we have asked you to speak on (as opposed to the topic it is easiest for you to speak on), and to consider broad implications of your topic for cosmic plasmas. In particular, please emphasize those aspects that may be applicable to other environments and parameter spaces - please show awareness of the ubiquity of plasma phenomena in the Universe. While many of the attendees will not be entirely familiar with your own work, all the attendees are able plasma physicists and will have views on how your work can relate to other problems. Take a bit of time to outline what we don't know, and how this lack of knowledge may be resolved.

Location: The Workshop will be held at the International Space Science Institute, Hallerstrasse 6, 3012 Bern, Switzerland.

Attendance: by invitation only. The Draft Program attached to this Second Circular only names confirmed participants in the Workshop.

Funding: ISSI will provide the subsistence costs (hotel and a per diem to cover meals) to all participants, but not the travel costs. There will be no registration charge for the Workshop.

Young scientist program of ISSI

Up to six young scientists will be invited to participate in the Workshop. The definition in this context is that they should be within 2 years of their PhD (plus or minus). ISSI will cover the subsistence costs (hotel and meals) to the invited young scientists.

Travelling to Bern

Bern can be reached easily from two international airports: [Zurich \(ZRH\)](#) and [Geneva \(GVA\)](#). Direct intercity trains to Bern depart every half hour from inside the airport buildings; see www.rail.ch for detailed departure times. The travel time is ~1.5 hours from Zurich airport and ~2 hours from Geneva airport.

There is also a local airport (Bern, BRN <http://www.flughafenbern.ch/>), located a 20 minute shuttle ride from the city centre, with direct connections to Munich, Berlin Schönefeld, Hamburg, Amsterdam, London City, Vienna and Paris Orly.

Bern is connected to many European cities by fast intercity trains (e.g. TGV Paris-Bern in 4.5 hours, or Frankfurt-Bern 5 hours). Timetable information of trains within and around Switzerland can be found at www.rail.ch. Also check out our website www.issibern.ch/ for a few more travel tips such as links to city maps of Bern, weather forecasts, tourist information etc...

Hotel reservations

A block booking has been made in city centre hotels for the Workshop. All participants at the workshop are requested to contact the workshop secretary, Jennifer Zaugg (Tel. +41-31-631-4896, Fax: +41-31-631-4897, email: Jennifer.Zaugg@issibern.ch), to indicate their arrival and departure dates and times, as well as any special requests they may have (e.g. double room). Please note that all hotel reservations have to be done by the ISSI Secretariat.

A confirmation will be returned within a few days. Block bookings have been made in nearby hotels; please see <http://www.issibern.ch/localguide/location.html> for maps that indicate the location of ISSI and of the hotels (go to “hotels”, and near the bottom of the page “map of hotels”).

Schedule:

Invitations and First Circular:	25 October 2011
Registration deadline:	30 November 2011
Second Circular and final program:	1 March 2012
Workshop:	16 – 20 April 2012