

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

14 February 2011

Particle acceleration in cosmic plasmas

Convenors:

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Context: The International Space Science Institute (ISSI) is planning to hold 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 is the first to be implemented. The two subsequent Workshops are expected to cover the “Microphysics of governing processes in cosmic plasmas” and “Multi-scale structure formation and dynamics in cosmic plasmas”.

Objectives of the Workshop:

Critical assessment of acceleration mechanisms and observations on a range of scales from suprathermal particles in the heliosphere to high energy cosmic rays [10^3 eV to 10^{20} eV] and a constructive comparison of acceleration processes across the scales.

The draft program (attached) covers the following main themes

- Review of observations of accelerated particles on all scales: *in situ* and remotely from space, and also ground-based, from the magnetosphere to extragalactic scales
- A detailed assessment of the physical processes underlying particle acceleration in the different physical environments: the aurorae, the Earth's radiation belts, bow shock- and interplanetary shock associated particles, flare-accelerated and generally solar energetic particles, acceleration at and beyond the heliospheric

termination shock, particles accelerated by supernova remnants, jets, pulsars, gamma ray bursts. Competing processes in different physical contexts will be critically evaluated.

- Acceleration mechanisms in general:
 - o Shocks and diffusive shock acceleration, magnetic field amplification,
 - o Stochastic acceleration (2nd order Fermi): its mechanisms in the different environments, and its possible role on largest scales for accelerating highest energy cosmic rays
 - o Turbulent acceleration: the description of mechanism and applicability across the cosmic scales
 - o Acceleration in current sheets; acceleration by parallel electric fields; their applicability in different physical contexts
 - o Nature of acceleration process and its possible scale-dependence that gives a distribution function with a power law in particle speed, with a spectral index of -5.
 - o The contribution of different simulation and modelling studies to the understanding of the particle acceleration processes
- The status of particle acceleration research and future perspectives: identification of shortcomings in the theory, gaps in the observations and the improvements needed to remedy those 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 talks presented at the Workshop and will be moderated by the discussions 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 2011.

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 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.

Equipment available at ISSI

ISSI is equipped with a pool of different kinds of workstations such as PCs, Macs as well as with Postscript printers for both black & white and colour. All machines have Ethernet connections and run web browsers, ssh, telnet, ftp, etc., so connecting home, accessing email, printing, etc. while at ISSI will be no problem.

Participants who bring their own notebook computers will be able to connect to the Ethernet through the standard RJ45 plug. A limited number of cables are available at ISSI and addresses will be dealt out by our DHCP server.

We also provide wireless access; participants wishing to use that will receive a username/password combination from our computer engineer and system administrator, Saliba F. Saliba (saliba@issibern.ch), who will also help with any computer-related questions.

The ISSI Seminar Room where the Workshop will be held is equipped with a computer and beamer for electronic presentations, a video/DVD player, an overhead projector and a whiteboard.

Social program

An informal welcome drink will be offered at the end of the first day at ISSI, on Monday, 16 May 2011. On Wednesday 3 March the afternoon will be free so that participants can explore Bern and its many attractions. We will hold a workshop dinner on Wednesday 18 May in one of Bern's renowned restaurants.

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), located a 20 minute shuttle ride from the city centre, but with direct connections only to Munich, Brussels and Paris. 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”).