

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

# Supernovae

**3 - 7 October 2016**

### Conveners

Andrei Bykov (Ioffe RU & ISSI, CH)  
Roger Chevalier (University of Virginia, USA)  
Maurizio Falanga (ISSI, Bern, Switzerland)  
John Raymond (Harvard-Smithsonian Center for Astrophysics, USA)  
Friedrich-Karl Thielemann (University of Basel, Switzerland)  
Rudolf von Steiger (ISSI, Bern, Switzerland)

**Local Organisation:** Alexandra Lehmann, ISSI, [Lehmann@issibern.ch](mailto:Lehmann@issibern.ch)  
Phone: +41 31 631 48 96, Fax: +41 31 631 48 97

### **The Workshop web site :**

<http://www.issibern.ch/workshops/supernovae/>

### The Context of the Workshop

The International Space Science Institute (ISSI) is holding a series of three Workshops on physics of astrophysical objects with extreme energy release ranging from black holes of stellar mass to clusters of galaxies. The workshops series follow the ISSI Workshops held in 2010-2015 which covered our contemporary knowledge of astrophysical magnetic fields of different scales, turbulence and particle acceleration processes in cosmic plasmas. The present Workshop intends to be a wide and deep discussion of the physics of supernovae, events with extreme luminosity and energy release. The Workshop will review the observations and theory of supernovae with the aim of understanding the physics of supernovae, their multi-wavelength observational appearance and spectral formation. Attention will be given to the role of SNe in cosmology, the effect of supernovae on chemical evolution of the interstellar medium, dust formation, astroparticle physics and cosmic ray acceleration.

### Objectives of the Workshop

The ISSI Workshop "Supernovae" (October, 2016) is devoted to an in-depth examination of complex astrophysical events with extreme energy release via multi-wavelength observations and modeling. Supernova explosions at the final stages of stellar evolution are known to be the major sources of chemical elements, turbulent energy and relativistic particles in galaxies. They are a key element of galactic ecology and evolution both in starburst and normal galaxies. The extreme physical conditions

that are present in supernovae are unreachable in terrestrial laboratories and therefore these sources provide unique opportunities to test physical laws under extreme conditions. Moreover, the study of supernovae has led to new discoveries in fundamental physics as demonstrated by advances made in dark energy cosmology from a thorough analysis of Type Ia supernovae as "standard candles" to measure cosmological distances. Furthermore, supernovae are related to the brightest cosmological transients - gamma-ray bursts -- and to the origin of magnetars, objects with the highest magnetic fields ever recorded and a subject of previous astrophysical ISSI workshops. Special attention will be given to the physics of unusual supernovae including superluminous, faint, and fast evolving supernovae. Future multi-messenger studies in the entire band from radio to gamma-rays, combined with the fast growing neutrino and gravitational wave facilities, will be discussed in the workshop and presented in the ISSI Springer book.

### **The Workshop will cover the following main themes:**

The main goal of the proposed ISSI Workshop is to discuss the state of the art of the research and future prospective of studies of supernovae. Following discussions by the Conveners, it is proposed that the Workshop will cover the following main themes:

- **The current status and perspective of Type Ia and core collapse supernova observations and modeling**
- **The role of Type Ia supernovae in cosmology**
- **Stellar and supernovae nucleosynthesis**
- **Supernova progenitors and environments**
- **Superluminous supernovae**
- **Dust production in supernovae**
- **Neutrino, cosmic rays and gravitation waves**

Presentations by those attending will be structured around the above headings. This list, subject to discussion and assessment at the Workshop, should become the set of chapter headings for the ISSI book. All of those attending will be expected to contribute to one or more of the chapters.

### **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 9 sections and between 10 and 15 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 will be held among the participants during the Workshop.

### **Location**

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

### **Attendance**

This will be by invitation only with ~ 42 participants maximum including young scientists. The draft version of the Workshop program is attached to this 2nd circular.

### **Young Scientists**

Under its special program for supporting young scientists, ISSI invited four early career scientists, within two years of their PhD, to take full part 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. This refers only to the participants; in case they bring their partners or families, they will need to pay for the additional cost of the accommodation. There will be no registration fee for the Workshop.

### **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](http://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](http://www.rail.ch). Also check out our website [www.issibern.ch/](http://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, Alexandra Lehmann (Tel. +41-31-631-4896, Fax: +41-31-631-4897, email: Lehmann@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 made by the ISSI Secretariat. The invitation letters for visas etc can be obtained from 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 the Second Circular:	30 April 2016
Registration deadline:	10 August 2016
Final program:	1 September 2016
Hotel deadline:	12 September 2016
Workshop:	3–7 October 2016