

ISSI Workshop on Electron Kinetic Physics: The Next Frontier in Space and Astrophysical Plasmas

22-26 April 2024

Second Circular

Objectives of the workshop

The workshop will explore the key science questions in the interdisciplinary field of *electron-astrophysics*. This emerging field studies the fundamental plasma processes in the electron-kinetic regime and their impact on the global dynamics and thermodynamics of space and astrophysical plasmas.

Our main objective is to make progress by providing a forum for scientists from different disciplines to discuss and debate current topics of electron-astrophysics in a stimulating environment. We aim to bring together experts working on plasmas in the heliosphere (including the solar atmosphere and the solar wind), in the planetary context, and in astrophysical systems beyond the solar system.

Organisation of the workshop

The workshop will start on Monday 22 April at 9:00 and end on Friday 26 April at 12:00. The sessions will be structured around three transdisciplinary Themes:

- **Theme 1: What is the nature of waves and fluctuations at electron-scales in astrophysical plasmas?** This includes electron-scale plasma waves and instabilities in astrophysical systems, and the nature and properties of electron-scale plasma turbulence.
- **Theme 2: How are electrons heated and accelerated in astrophysical plasmas?** This includes electron-scale dissipation processes, electron-scale physics of collisionless shock waves, and electron physics of magnetic reconnection.
- **Theme 3: What processes govern the heat conduction of electrons in astrophysical plasmas?** This includes electron heat conduction of collisionless plasmas, and effective heating models/functions and large-scale implications of electron heat conduction.

The workshop will begin on Monday with an introduction to the workshop and the attendees, followed by a series of solicited stage-setting talks on each of the three Themes. These will be followed by moderator-led plenary discussions to which all participants are invited to contribute. Towards the middle of the week, we will discuss the list of review articles that will come out of this workshop (titles, focus, authors) in plenary and in breakout sessions. As this is a workshop and not a conference with a rigid programme, we highly recommend that all participants attend the meeting in person so that they can fully engage in open but lively discussions.

Contributions from participants

All participants are invited to contribute to the stage-setting talks **and** to the plenary sessions, with the possibility of presenting in more than one session.

We strongly encourage all participants to prepare the following before coming to the workshop:

- As individual contributions to the stage-setting talks: **Before 19 March, prepare 1-2 slides** summarising the state of the art of one of the Themes above, *in your area of expertise*, focusing on recent advances and open questions. You may wish to contribute to more than one Theme depending on your area of expertise and interest. Please send your slides to the stage-setting speakers no later than 19 March so that they can incorporate them into their presentation and, if necessary, interact with you to refine their message. The list of speakers will be made available at the beginning of March.
- For informal contributions during the plenary sessions: we encourage you to present your work during the discussion sessions, addressing the current state of understanding and important open science questions in your area of expertise. To help us shape the programme, we kindly ask you to **submit a short abstract of your contribution by 4 April** using this online form: <https://forms.gle/ScjsMvwboya1QwsG7>. Use the same form again if you wish to submit a contribution in more than one Theme. When preparing your presentation, please take into account the different backgrounds of the participants to make your message understandable to all.

Outcome of the Workshop

An important aim of the workshop is the production of a high-level book published in the Space Sciences Series of ISSI (SSSI) by the publisher Springer (see www.issibern.ch/publications). This volume is NOT intended to be the proceedings of the workshop but a collection of in-depth review papers informed by the contributions and discussions at the workshop. It should provide a coherent picture of the current state of the subject, important open science questions, and suggestions for research programmes leading to their resolution. We aim to involve authors from all participating communities in each paper to reflect the cross-cutting nature of our discussions also in the publications. All papers will be peer-reviewed. The papers will be published both in the hardcover book in this series and also individually in Space Science Reviews. We expect the papers to be submitted within 6 months of the workshop so they can reflect the discussions during the workshop and be made available to the community in a timely manner. The journal issue and the SSSI volume are expected to appear about 12 months after the workshop. Electronic versions of the articles will be online as soon as accepted.

Venue and travelling to Bern

Bern is ideally 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. For those attending the EGU in Vienna, there is a sleeper train connecting Vienna to Zürich. Bern can be reached easily from three international airports: Zurich (ZRH), Basel-Mulhouse (BSL), and Geneva (GVA). Zurich is the largest and best-connected one. Direct intercity trains to Bern depart every half

hour from inside the airport buildings; see www.rail.ch. The travel time is approximately 1.5 hours from Zurich airport and 2 hours from Geneva airport.

Updated information on COVID-19 and travel restrictions is available [here](#).

Invitation letters for visas or other purposes can be requested from the ISSI Secretariat and will be sent within a few days. For visa entry requirements, see <https://www.schengenvisa.info.com/switzerland/visa/>

Hotel reservations

ISSI will provide the subsistence costs to all participants (i.e., hotel costs plus a per diem) from Sunday 21 April until Saturday 27 April but not the travel costs. There is no registration fee for the Workshop.

A block booking has been made in city centre hotels for the Workshop. **Please confirm the dates of your stay by 19 March** at the latest by contacting Dominique Fuchs or Xeila Monteagudo (secretary@issibern.ch, or Tel. +41 31 684 4896), indicating your arrival and departure dates as well as any special requests you may have (e.g., double room, dietary restrictions for the conference dinner). Please note that all hotel reservations are made by the ISSI Secretariat only.

Workshop web page

You will find a regularly updated schedule and a list of participants at <https://workshops.issibern.ch/electron-kinetic-physics/>

Conveners and Contact

Daniel Verscharen (University College London, United Kingdom)
Aurora Simionescu (SRON, the Netherlands)
Oreste Pezzi (Institute for Plasma Science and Technology, National Research Council, Italy)
Julia Stawarz (Imperial College / Northumbria University, United Kingdom)
Kris Klein (University of Arizona, USA)
Denise Perrone (Italian Space Agency, Italy)
Rumi Nakamura (IWF/OEAW, Graz, Austria & ISSI, Switzerland)
Thierry Dudok de Wit (ISSI, Switzerland & University of Orléans, France)

Local organisation: Xeila Monteagudo and Dominique Fuchs, secretary@issibern.ch,
Tel. +41 31 684 48 96

For questions regarding the scientific programme: Thierry Dudok de Wit, ddwit@issibern.ch