

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

# **Solar and Stellar Dynamos: A new Era, 13 – 17 June 2022**

### **Conveners**

Robert Cameron	MPS, Göttingen
Paul Charbonneau	Université de Montréal
Mausumi Dikpati	HAO/NCAR, Boulder
Hideyuki Hotta	Chiba University
Leonid Kitchatinov	ISTF, Irkutsk
Manfred Schüssler	MPS, Göttingen

### **Local organisation/Workshop secretariat**

Jennifer Fankhauser/Yemisi Momoh, [secretary@issibern.ch](mailto:secretary@issibern.ch), +41 31 631 48

### **Workshop web site**

<https://www.issibern.ch/workshops/solsteldynamos>

### **Objectives and content of the Workshop**

The idea of the workshop is to take stock of the considerable progress in our understanding of many aspects of solar and stellar dynamos that has been made during the last decade. This became possible thanks to a wealth of observations from the ground and from space, the study of simplified models, and a new generation of comprehensive 3D MHD simulations.

Simulations are successfully used to study cyclic large-scale dynamo action as well as the crucial processes of formation, rise, and emergence of magnetic flux loops. The operation of small-scale dynamo processes is revealed by high-resolution solar observations, which can be directly compared with numerical simulations of radiative MHD. Observations from ground and from space are dramatically increasing the amount of information on rotation, magnetic activity, and cycles for a wide range of stellar parameters and evolutionary stages. These developments herald the beginning of a new era in dynamo research. Growing understanding of the underlying processes and the possibility to compare with a broad base of observational data puts the necessary parametrizations in simplified dynamo models (e.g., “classical”  $\alpha$ -effect models, flux-transport dynamos, or Babcock-Leighton models) on a firmer basis. The workshop will bring together key players in the different relevant areas: solar and stellar observations, numerical simulations, mean-field theory, and dynamo models. We will review the state of the art, outline the open questions, and discuss approaches to make further progress.

The Workshop will cover the following main themes:

1. Introduction and basic observations
2. Mechanisms and processes  
(*mean flows, turbulent processes, overshoot & tachocline, magnetic structure formation, flux emergence, surface evolution*)
3. Models  
(*mean-field models, Babcock-Leighton and flux-transport dynamos, nonlinearity and stochasticity*)
4. Simulations

### **Product**

The principal aim of the workshop is the production of a volume to be published in the Space Sciences Series of ISSI by Springer Verlag. This volume is NOT intended to be the proceedings of the workshop, but will provide a coherent collection of in-depth papers informed by the presentations and discussions at the workshop. All of those attending will be expected to contribute to one or more of the chapters. The volume will give an overview of the current state of our subject and it is our ambition that it will become a reference book for a considerable period of time. All papers will be peer-reviewed and, in addition the book, be published individually in the journal Space Science Reviews. We expect that the papers will be submitted within 3-4 months of the workshop. The journal issue and the volume are expected to appear within 12 months after the workshop.

### **Location and travelling to Bern**

The Workshop will be held at the International Space Science Institute, Hallerstrasse 6, 3012 Bern, Switzerland. Bern can be reached easily from three international airports: Zurich (ZRH), Basel 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. 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 and so on.