

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

11 May 2012

The Physics of Accretion onto Black Holes

8 - 12 October 2012

Conveners

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Background

Accreting black holes are ideal laboratories for studying both physical properties of accretion onto compact objects and effects of General Relativity in the strong field regime. These are extreme phenomena, which are inaccessible from laboratory experiments. Since the first discovery of accreting X-ray binaries (XRB), our knowledge has advanced significantly, opening the possibility of using these systems as laboratories for fundamental physics. In order to seek for signatures, one must trace the dynamics of matter moving very close to the compact object, where the effects of GR become noticeable. At the same time, the process of accretion onto a compact object is understood only partially. The structure of the accretion flow is very complex and variable in time. Its innermost regions, within a few gravitational radii from the central object where relativistic effects are at work, are the most complex to study. Their emission is composed of several components originating from different parts of the flow; the decomposition of the energy spectrum is complex and not unique, so that many aspects are still under investigation, although the last decade has provided a solid framework. The accretion and strong-gravity aspects of the problem are very interesting and need to be disentangled in order to make significant advancement. In other words, we are trying to discover direct evidence of strong-gravity effects using the accretion flow onto a compact object, while at the same time using curved space-time to understand the properties of accretion. Finally, it is now clear that the presence of powerful relativistic jets and outflows from these systems is a key ingredient to understand their properties and can account for more than half of the available energy.

Objectives of the Workshop:

The Workshop is designed to review in depth what has been achieved in the research on accretion on all scales, from galactic binaries to intermediate mass black holes to super-massive AGN, and discuss possible future directions. The main goal of the proposed ISSI Workshop is to discuss the state of the art of the research on black hole accretion.

Following discussions by the Conveners, it is proposed that the Workshop will cover the following main themes:

1. Introduction (Historical perspective)
2. Physical models for the accretion flow around black holes of all masses
3. Accretion on black holes from stellar mass to supermassive
4. Black hole fundamental parameters
5. Accretion jets outflows
6. Overview and outlook

Short presentations by those attending will be structured around the above headings. This list could, subject to discussion and assessment at the Workshop, 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 or for the discussions during the talks.

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 6 sections and between 15 and 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 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 ~ 40 participants maximum including young scientists.

Young scientists

Under its special programme for supporting young scientists, ISSI will invite around five early career scientists, within two years of their PhD, to take a 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. There will be no registration fee for the Workshop.

Schedule

Invitations and First Circular:	11 May 2012
Registration deadline:	11 June 2012
Second Circular and final program:	7 September 2012
Workshop:	8–12 October 2012