

This is Beyond

Your Standard Paradigm for Black Hole Accretion

Who are we?

We are an International Space Science Institute-Beijing team of black hole accretion disc observers and theorists at various career stages.

We are motivated by the latest advancements in high-S/N spectral and polarisation observations, revealing complex, but yet-to-be-fully-understood details of discs and winds in X-ray Binaries and Ultra-Luminous X-ray Sources, and high-cadence monitoring of transients—such as changing-look Active Galactic Nuclei and Tidal Disruption Events.

Together, we will answer the following two questions:

1. Where does the standard accretion disc model work the best?
2. What is the standard accretion disc model missing?

In addition, we aim to bridge the gap between observational and numerical simulation data. We want to connect previously separate communities and set an example of similar open-access collaboration for the future.

We further break down our task into the following objectives:

1. What physical processes drive accretion discs?

We will move beyond the “ α -prescription” using MHD simulations on observational signatures, such as disc variability, and on building non-stationary disc models, as seen in XRBs and TDEs.

2. What is the role of General Relativity?

We will move beyond the Newtonian regime using GR-MHD simulations for, for example, the plunging region, Lense–Thirring precession, returning radiation, and the interplay between jets and discs.

3. How do discs launch outflows?

Disc outflows are observed from sub to super-Eddington regimes. We will investigate how outflows predicted by GR-MHD and GR-R(adiation)-MHD simulations appear in real systems.

* Senior steering scientists ** Chair

We use state-of-the-art observations!

Sub-to-Near Eddington Accretion

Andrew Young* (Uni. of Bristol)

Adam Ingram (Newcastle Uni.)

Sophia Waddell (McGill Uni.)

Jiachen Jiang** (Uni. of Warwick)

Super Eddington Accretion

Ciro Pinto (INAF – IASF Palermo)

Yuhan Yao (UCB)

Keep in touch?

Are you interested in our work? Based on our observational and computational capabilities, what other aspects of accretion discs should we explore? Get in touch using the form below, or speak to Jiachen Jiang.



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Sub-to-Near Eddington Accretion

Nicolas Scepi (IPAG)

Andrew Mummery (Uni. of Oxford)

Super Eddington Accretion

James Stone* (Princeton Uni.)

Jane Dai (Uni. of Hong Kong)

Yanfei Jiang (Flatiron)

Brenna Mockler (Carnegie Obs.)