

**ISSI FINAL TEAM REPORT:**  
(This report should not exceed 2 pages)

1. Title of your Team project: Sombreros and lampposts: The Geometry of Accretion onto Black Holes
2. Objectives: Determining the geometry of inner accretion flow of X-ray binaries containing black holes in their states dominated by hard X-ray emission. View 1 (Sombreros): the outer accretion disc is truncated at a radius much larger than the innermost stable circular orbit, and the accretion flow becomes hot, emitting hard X-rays. View 2 (Lampposts): the disc extends to the innermost stable circular orbit and the hot X-ray source is above it, likely on the rotation axis of the black hole.
3. Dates of meetings: (1) 13 – 17 January 2020, (2) 29 November – 3 December 2021, (3) 12 – 16 September 2022
4. Participants (presenters only): Amir Levinson, Erin Kara, Chris Done, Iossif Papadakis, Barbara De Marco, Adam Ingram, Guglielmo Mastroserio, Javier Garcia, Marat Gilfanov, Andrei Beloborodov, Marta Dzielak, Tomaso Belloni, Riccardo La Placa, Alexandra Veledina, Samuel Barnier, Federico Garcia, Mariano Mendéz, Andrzej Niedźwiecki, Nikolaos Kylafis, Luigi Stella, Grégoire Marcel, Tenyo Kawamura, Chris Fragile, Scott Hagen, Andrzej Zdziarski
5. Assessment of the Team activities; highlights. The participants enthusiastically engaged in presenting their views; almost every presentation was followed by a long and heated discussion. Meetings 2 and 3 had each a large number of online listeners. A major highlight was discussions of the X-ray polarimetry results for Cyg X-1, where three of our participants were co-authors.
6. Outcome in relation to the objectives. Very significant progress was achieved in understanding physical processes taking place in the vicinity of black holes. For example, the soft X-ray reverberation was modelled in detail (Wang et al. 2020, Wilkins et al. 2021, De Marco et al. 2021). Our studies provided strong evidence for a complexity of the X-ray source, which can explain the apparent large width of the Fe K emission line in the presence of disc truncation (e.g. Zdziarski et al. 2021, 2022, Dzielak et al. 2021, Axelsson & Veledina 2021). The X-ray polarization strength and angle in Cyg X-1 show that the emitting plasma is spatially extended in a plane perpendicular to, not parallel to, the jet axis, ruling out vertical, lamppost, coroneae.