

Department of Physics and Astronomy Colloquium Series

Tuesday October 29th 2024, 2:30pm in PSE 317

Speaker: Gibwa Musoke

Institution: University of Toronto

Title: Forming truncated accretion disks

Abstract:

Black hole X-ray binaries and Active Galactic Nuclei transition through a series of accretion states in a well-defined order. During a state transition, the accretion flow changes from a hot geometrically thick accretion flow, emitting a power-law-like hard spectrum to a geometrically thin, cool accretion flow, producing black-body-like soft spectrum. The hard intermediate accretion state present in the midst of a state transition is thought to be associated with the presence of both a hot geometrically thick component, termed the corona, and a cool, geometrically thin component of the accretion flow. The details concerning the geometry of the disk in the hard intermediate state are not agreed upon and numerous models have been proposed: In the “truncated disk” model, the accretion flow is geometrically thick and hot close to the black hole, while the outer regions of the flow are geometrically thin and cool. There are many open questions concerning the nature of truncated accretion disks: Which mechanisms generate the truncated disk structure? What sets the radius at which the disk truncates? How is the corona formed and what is its geometry? In this talk I present the first high-resolution 3D General Relativistic Magneto-Hydrodynamic (GRMHD) simulation and radiative GRMHD simulation modelling the self-consistent formation of a truncated accretion disk around a black hole.