DEPARTMENT OF PHYSICS AND ASTRONOMY

COLLOQUIUM ***IN-PERSON EVENT***

How do the most luminous black holes accrete and expel gas?

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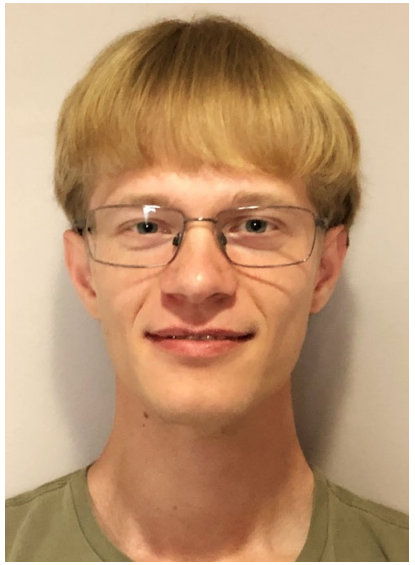
The gravitational pull of a black hole attracts gas and forms an accretion disk where the interplay between hydromagnetic processes and the warping of space-time releases gravitational energy in the form of radiation, relativistic jets, and winds. Most gas falls into supermassive black holes when the accretion rate approaches the Eddington limit (L=Ledd), at which point radiation pressure overcomes gravity. To date, our knowledge of such `luminous' black hole accretion disks mostly relies on semi-analytical models, supplemented by a very limited set of numerical simulations. In my talk I will discuss new insights gained from state-of-the-art radiative general relativistic magnetohydrodynamics (GRMHD) simulations of accretion near the Eddington limit. After demonstrating that magnetic fields lead to the formation of a hot corona, I will show that, when the accretion disk is misaligned with the spin axis of the black hole, accretion is driven by shocks. This challenges the current paradigm of turbulence-driven accretion. I will subsequently demonstrate that the spin of a black hole can overwhelm viscous torques and tear misaligned disks apart, which naturally explains both low and high frequency quasi-periodic oscillations (QPOs). I will finish my talk by discussing the opportunities the next-generation of GRMHD simulations will bring in addressing accretion from galaxy scales to event horizon scales.



Thursday, October 26, at 3:55 PM

IN-PERSON EVENT ROOM 202

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