

Tuesday, November 23rd, 2:30 pm

Speaker: Kate Alexander

Institution: Northwestern University

Title: Cosmic Extremes: Time-Domain Astrophysics in a Multi-Messenger World

Abstract:

Time-domain astrophysics provides a unique opportunity to study the most extreme physical processes in the Universe, including the acceleration of particles to high energies, the creation and merger of compact objects like neutron stars and black holes, and the tidal disruption of stars by supermassive black holes. I will discuss my recent and ongoing work to reveal the formation and structure of relativistic jets and outflows in the most extreme classes of astrophysical transients, including gamma-ray bursts (GRBs) and tidal disruption events (TDEs). In particular, I will show that radio observations of these transients can reveal the total energy contained in outflowing material, the magnetic field strength and geometry, and the density of the surrounding environment, which can inform stellar evolution models (GRBs) and probe models of black hole growth and accretion (TDEs). With the pioneering detections of gravitational waves, astronomers and physicists have gained a new, complementary tool to study compact object mergers and their associated GRBs, with implications for fields as wide-ranging as general relativity, nuclear physics, cosmology, and shock physics.