

1 Understanding the properties of pulsating ultra-bright X-ray sources (PULX) through 3D GRMHD ray simulations

In recent years, ultraluminous X-ray sources (ULXs) have become a subject of great interest in astrophysics. These objects have been observed to emit X-rays at luminosities far beyond the Eddington luminosity of a neutron star. The discovery of periodic variations in the X-ray emission from Pulsating ULXs (PULXs) provided new insights into the nature of ULXs and suggests that a PULX is a neutron star accreting beyond the Eddington limit. In the proposed study we aim to study PULXs, which must be accreting pulsars. Through global three-dimensional simulations in radiative general relativistic magnetohydrodynamic (radiative GRMHD) code, we will investigate the physical processes involved in accretion onto magnetized pulsars and the spin evolution of pulsars. We will study the impact of a variety of parameters including strength and tilt angle of the magnetic field, spin, accretion rate, and radiation pressure on the luminosity and pulsation of PULXs.