Title

Probing The Origin of Late-Time Radio Emission in TDEs

Abstract

Recent observations have discovered that radio emission from ~40% of tidal disruption events (TDEs) can rapidly turn on 2-3 years after disruption, despite being absent at an early time. Multi-frequency observations allow us to measure the physical properties of the radio-emitting outflows (radius, energy, ambient density), and it is clear from this initial sample that there is high diversity in this population in features such as timescale of the outflow, evolution, the peak frequency of emission, and other properties. However, it is the evolution of these properties that can unveil the origin of the late emission- off-axis jets, delayed launch, or interaction with a dense region near the supermassive black hole- as well as how they compare to TDEs detected in radio at early times. Here we request observations of four TDEs at late times to measure velocities, changes in energy, and radial evolution of the density, which will directly reveal the underlying mechanism for the late emission. We request two 3-hour S+L+UHF observations of two extremely southern TDEs that have brightened by a factor of ~10x over 1,000 days post-disruption, and four 1 hour UHF-only observations for 2 TDEs, to be coordinated with VLA observations. Our total request is 16 hours to unveil the origin of an unexpected phenomenon in TDEs.