Contribution ID: **40** Type: **Talk**

Eccentric tidal disruption event discs around supermassive black holes: dynamics and thermal emission

Thursday, 9 June 2022 13:50 (20 minutes)

After the tidal disruption event (TDE) of a star around a supermassive black hole (SMBH), if the stellar debris stream rapidly circularizes and forms a compact disc, the TDE emission is expected to peak in the soft X-ray or far ultraviolet (UV). The fact that many TDE candidates are observed to peak in the near UV and optical has challenged conventional TDE emission models. By idealizing a disc as a nested sequence of elliptical orbits that communicate adiabatically via pressure forces, and are heated by energy dissipated during the circularization of the nearly parabolic debris streams, we investigate the dynamics and thermal emission of highly eccentric TDE discs, including the effect of general-relativistic apsidal precession from the SMBH. We calculate the properties of uniformly precessing, apsidally aligned, and highly eccentric TDE discs, and find highly eccentric disc solutions exist for realistic TDE properties (SMBH and stellar mass, periapsis distance, etc.). Taking into account compressional heating (cooling) near periapsis (apoapsis), we find our idealized eccentric disc model can produce emission consistent with the X-ray and UV/optical luminosities of many optically bright TDE candidates. Our work finds stream-stream collisions are a promising way to power optically bright TDEs.

Primary authors: ZANAZZI, John (Canadian Institute for Theoretical Astrophysics); Prof. OGILVIE, Gordon (University of Cambridge)

Presenter: ZANAZZI, John (Canadian Institute for Theoretical Astrophysics)

Session Classification: TIdal Disruption Events

Track Classification: TIdal Disruption Events