Theoretical and observational investigation of tidal disruption events

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Most of the known galaxy are thought to be hosting a supermassive black hole (SMBH), with a mass ranging from millions to billions of solar masses, at their centre. These SMBHs are surrounded by orbiting stars.

If one of this stars wonders too close to the hole, it will get destroyed by the tidal forces of the black hole. The debris resulting from the stellar disruption will be partially accreted onto the black hole. During this process a bright accretion disc is formed and these events are called tidal disruption events (TDEs).

If it is a stellar binary system that passes too close to the hole one of the star of the binary can get accelerated to up to several hundreds of kilometres per second, allowing it to escape the galaxy attraction and generating a so-called HyperVelocity Star (HVS).

Given the bright emission on several band of the electromagnetic spectrum (from radio to gamma) of the former kind of event and the peculiarity of the latter, this phenomena represent a unique opportunity to study otherwise quiescent (non-AGN) galactic centres and to infer the properties of the SMBHs there hosted.

My present and future work focuses on the role of stellar rotation (both intial and induced) in the tidal disruption event of single stars or stellar binary systems by SuperMassive Black Holes (SMBHs).

I investigate these events through analytical calculations, numerical simulations (using an SPH code) and hopefully in the near future also astronomical observations.