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Tidal Disruption Events: Unique probes of outflows and accretion in supermassive black holes

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Supermassive black holes (SMBHs) lie at the centers of most galaxies, but the processes by which they grow and launch outflows that shape the galaxies around them remain poorly understood. In this talk, I will focus on tidal disruption events (TDEs) as probes of relativistic processes powered by SMBHs. A TDE occurs when a star passes too close to a SMBH and is torn apart by tidal forces from the strong gravitational field, injecting a large amount of gas close to the event horizon. TDEs therefore provide a valuable opportunity to test theories of SMBH accretion and to study the formation and growth of relativistic jets and outflows. Mass ejection in TDEs is best characterized via radio observations, which reveal synchrotron radiation produced in the shock formed between fast-moving outflows and the ambient interstellar medium. Radio observations of TDEs allow us to (1) determine the properties of outflowing material (energy, size, expansion velocity) and (2) trace the ambient density profile around previously-dormant SMBHs on scales of a few light years. I will discuss exciting ongoing observations of TDEs in the local Universe, which reveal an unexpectedly diverse population. The increased sample size now being realized by wide-field surveys has enabled the first constraints on the prevalence of radio emission in TDEs weeks to years post-disruption, which will shed further light on the physical conditions required for jet and outflow formation.

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