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## The origin of TDE emission

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We present, for the first time, a fully self-consistent radiation hydrodynamic simulation of a realistic tidal disruption event (TDE). TDEs are highly luminous, multiwavelength astrophysical transients that carry great promise for measuring the properties of supermassive black holes, but the complex physics and large dynamic range of the problem has until now prevented self-consistent simulations with realistic parameters. Using the moving mesh code RICH, we evolve a solar mass star from its (destructive) first passage through the tidal radius of a  $10^6$  solar mass SMBH, up through the first fallback of debris, and beyond.

We show that the shock heating of the gas as it passes through pericenter is the main luminosity source of the observed early time emission. No efficient circularization is observed, ruling out certain classes of TDE models for “typical” TDE parameters.

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