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Tidal Disruption of a Star By a Massive Black Hole: the Fate of the Debris ROSEANNE CHENG, Center for Relativistic Astrophysics at Georgia Tech, CHARLES EVANS, University of North Carolina at Chapel Hill, TAMARA BOGDANOVIC, Center for Relativistic Astrophysics at Georgia Tech — When a star disrupts near a black hole, some of the debris is ejected from the system and the rest that is bound eventually accretes onto the black hole. The fate of the debris is dependent on the type of star and the mass and spin of the black hole. We present results of a numerical code constructed to obtain accurate simulations of relativistic encounters between a star and a massive black hole. The tidal interaction is calculated in Fermi normal coordinates (FNC), a frame centered on the star. We simulate an encounter between a white dwarf and an intermediate mass black hole at the threshold of disruption. While Newtonian treatment of hydrodynamics and self-gravity is sufficient to accurately describe the structure of the star, we find that there are several significant relativistic terms in the expansion [of the black hole's tidal field] that should be retained. We consider the importance of these terms for the dynamics of the debris from the tidally disrupted star.

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