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Two types of extreme nuclear transients

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Galactic nuclei are extreme environments where stars are densely packed around a supermassive black hole (SMBH). Occasionally, dynamical interactions in the galactic center cause stars to interact violently at short distances with each other or with the SMBH, resulting in the formation of nuclear transients. In this talk, I will discuss two types of extreme nuclear transients: extreme tidal disruption events (eTDEs) and high-velocity destructive stellar collisions. TDEs are one of the most dramatic nuclear transients in which a star is tidally disrupted by the SMBH, generating a bright flare. eTDEs are the most relativistic observable TDEs, constituting the majority of TDEs by relatively massive BHs (> 10^7Msol) with observational signatures qualitatively different from those of ordinary TDEs. On the other hand, high-velocity destructive stellar collisions occur when two stars collide at velocities exceeding their surface escape velocity (> 1000km/s) near the central SMBH. The collision product, a homologously expanding gas cloud, can generate a UV/optical flare as bright as TDEs. Subsequently, the expanding gas cloud would interact with the nearby SMBH, generating a second, possibly even brighter, accretion-driven flare. I will conclude the talk with the implications of these events.

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