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Black Hole Demographics in Low-Mass Galaxies: Improving Tidal Disruption Event Rate Estimations

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Measuring massive black hole (MBH) demographics in low-mass galaxies provides a promising route toward constraining the different theoretical seeding mechanisms for MBHs. The advent of the Rubin Observatory (LSST) will allow tidal disruption events (TDEs) to be used in measuring MBH demographics. This measurement requires accurate TDE rate predictions. The current, widely used TDE rate estimates of Stone & Metzger (2016) do not account for stellar density components resulting from the presence of nuclear star clusters (NSCs). Due to the prevalence of NSCs in galaxies with masses between 10^8 and 10^{10} M⊙ paired with the large enhancement in TDE rates caused by the presence of NSCs (Pfister et al. 2020), the rates of TDEs in these galaxies are determined by the density profiles of their NSCs. In this work, we are constructing the largest currently available set of high-resolution 3-D stellar density profiles of galaxies with NSCs. We are using these stellar density profiles to develop accurate relations between the stellar mass/type of galaxies and their central density profiles. We then combine these relations with realistic model galaxy distributions to create new loss-cone models and improve TDE rate estimates. With these estimates, we will predict the galaxy demographics of TDE hosts for ZTF and Rubin with a wide range MBH demographic scenarios.