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Formation of Nuclear Star Clusters and Supermassive Black Holes via First-Generation Globular Cluster Disruption.

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The Nuclear Star Cluster (NSC) resides at the center of the Milky Way galaxy and represents an extremely dense stellar system. Most such systems are also known to harbor Supermassive Black Holes (SMBHs).

Several mechanisms have been proposed to explain the formation of NSC+SMBH structures, with two prevailing scenarios:

- (i) the inward migration of gas toward the galactic center, followed by star formation from the accreted material, and
- (ii) the inward migration and subsequent disruption or merger of Globular Clusters (GCs), resulting in the buildup of a common NSC.

In our study, we focus on the second scenario —the complete decay of GCs during their interaction with the central NSC+SMBH. We model the orbital dynamics and mass loss evolution of present-day GCs, assuming they formed approximately 10 billion years ago. To accomplish this, we employ time-varying Milky Way-like potentials, extracted from the Illustris TNG-100 cosmological simulation.

References

- 1) A&A, 2023, 674, id.A70, 24 pp. 2) A&A, 2024, 689, id.A178, 17 pp.

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