

Bulletin of the AAS • Vol. 56, Issue 2 (AAS243 Abstracts)

Only the Special Survive: Star Cluster Disruption in Milky Way-like Galaxy Simulations

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Published on: Feb 07, 2024

URL: <https://baas.aas.org/pub/2024n2i458p20>

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There is currently a mismatch between the chemical fingerprint of a typical star of a given age at a particular location in the Galaxy and those within open clusters in the same area of the Milky Way. Studying open star clusters allows us to trace essential information throughout the rich history of our Galaxy, as we can measure their age and their chemical composition independently. While some open clusters interact with their environment, causing them to dissolve, a minority remains bound for billions of years. In order to investigate why some open clusters persist for a long time, we study the evolution of open clusters through time via simulations. We use galaxies drawn from the *Latte* suite of Milky Way-mass zoom-in cosmological simulations generated using the FIRE-2 code. This enables us to investigate where open clusters form, if and why they move from their radius of formation, and how they traverse and interact with the Galaxy over time. In this work, we focus on tracing the unique trajectories of three illustrative open clusters throughout time. In the future, we aim to compare the FIRE-2 simulation results to the observed results from the SDSS-based Open Cluster Chemical Abundance and Mapping (OCCAM) survey.