Abstract Submitted
for the CUWIP22 Meeting of
The American Physical Society

Searching for the remnants of the smallest, oldest, faintest galaxies accreted by the Milky Way HILLARY DIANE ANDALES, KALEY BRAUER, MIT Kavli Institute for Astrophysics and Space Research, ALEXANDER JI, University of Chicago, ANNA FREBEL, MIT Kavli Institute for Astrophysics and Space Research — The Milky Way (MW) grows by merging with or accreting other galaxies. Still, not much is known about how low-mass galaxies—the smallest, oldest, and faintest of which being the ultra-faint dwarfs (UFDs)—assembled to form the MW. To fill this gap, we search for UFD remnants in the outskirts ("stellar halo") of the MW using the kinematics of halo stars. Because the kinematics of halo stars retain information about their accretion origins, a cluster of halo stars in kinematic phase space may be the remnant of a progenitor UFD. However, the strength of this cluster-remnant correspondence is uncertain. To investigate this correspondence, we use 22 Milky Way-like halos from the Caterpillar simulations. We find that, among six clustering algorithms, HDBSCAN performs best at identifying true remnants. For UFD-mass remnants within 5 kpc (50 kpc) of the Sun, 17.81% (5.46%) of HDBSCAN clusters are true remnants. We also find that, compared to the median of all remnants, the recovered remnants have more recent accretion times, distinctively higher energy (2.5x), velocity (2.0x), angular momentum L_z (13.5x), J_r (11.1x) and J_z (6.3x). Ultimately, these results help inform the use of Gaia kinematics data in uncovering the formation history of the MW.

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Date submitted: 11 Jan 2022 Electronic form version 1.4