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Gaia DR3 view of dynamical substructure in the local stellar halo

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Galaxies stellar haloes are known to build up through the accretion of smaller systems, with stars from a single merger being deposited onto similar orbits. Since orbits can be characterized by their integrals of motion such as energy or angular momenta, we can thus search for the stellar debris of past accretion events by looking for over-densities in integrals of motion space (IOM). Using the Gaia DR3 data-set we identify such merger debris in the Milky Way halo near the Sun. We utilise a parameter-free clustering algorithm that allows us not only to find over-densities in IOM space but also to assess their statistical significance. We characterise the statistically significant over-densities using metallicity and chemical abundance information from Gaia DR3, LAMOST LRS DR7 and APOGEE DR17. We find that the local stellar halo contains 7 main dynamical groups, including in-situ structures, several previously known accreted substructures and one new substructure. In addition, we identify a large number of smaller clumps that are interesting dynamically with chemistry suggestive of an accreted origin. I will present an updated view of the Milky Way's accretion history that emerges from this analysis.

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