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GASTRO library: studying substructures of the Milky Way stellar halo with SPH + N-body single merger models

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The Milky Way (MW) experienced several merger events which left their imprints on the stellar halo. In particular, it is known that a major merger happened during the Galaxy's first Gyrs. In order to fully understand the effects of such an event, we need to know the chemical and dynamical characteristics of the young MW, i.e. before the major merger event, and the accreted satellite. For this purpose, we developed the Gaia-EncelAdus-Sausage Timing, chemistRy and Orbit (GASTRO) library: a suite of SPH + N-body models to explore formation scenarios of MW-like galaxies that went through similar accretion events. Such idealized models enable us to control the initial conditions of the merger and which physical processes are included, therefore understanding them better. In this short talk, I present a subset of the GASTRO library and explore the chemodynamical properties of the accreted stars. I show that single merger events spread over a large range in the energy-angular momentum plane and also have a rich chemical signature in the dynamical space. I also show that clustering algorithms, such as HDSBSCAN, can identify multiple clusters in this single merger event. Finally, I discuss the results and how to reconcile some substructures in the MW's stellar halo to a single merger event.

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