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Myths and challenges behind the formation of the Galactic disc

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The stars in the local stellar disc of the Milky Way (MW) exhibit a bimodal distribution in the chemistry of their alpha-process elements. This creates two distinct sequences: the high and low-alpha discs. Numerous hypotheses have been proposed to explain the origin of this bimodality, including the 'two-infall' model, which suggests two distinct epochs of gas accretion. This model is compatible with the recent discovery of an ancient and massive Galactic merger, the Gaia-Sausage Enceladus (GSE), which could have contributed the metal-poor gas needed to fuel the formation of the low-alpha sequence. In this talk I will analyse the Auriga galaxy simulations, which have been shown to feature GSE-like mergers and chemical distributions comparable to the high and low-alpha discs. I will investigate the various formation scenarios that can form a chemical bimodality, and show that these are not reliant on a MW-like accretion history or GSE-like merger event.

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