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Uncovering galactic disk properties with GECKOS

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Abstract

The edge-on inclination of galaxies in the sky allows the observational study of their vertical structure, the thickness of their disks, and the identification of different disk components. Most disk galaxies show a morphological structure with two disks of different thicknesses: the thick and the thin disk. Thick disks are faint and deep observations with long integration times are needed to analyze them in detail, making observations challenging and work limited to a small sample. The origin of thick disks and their evolutionary connection with thin disks is still a matter of debate. In this work, we propose the study of thick and thin disks in the new integral field spectroscopy data from the GECKOS survey. The ongoing GECKOS survey, with a total sample of 35 edge-on galaxies observed with MUSE at VLT, provides an opportunity to put constraints on different formation scenarios for disk structures. For a subsample of 6 to 12 galaxies for which MUSE fully reduced data cubes are available to the GECKOS team, we will map stellar properties such as age, metallicity, and the abundance of α elements, and extract the star-formation history of thick and thin disks. This will allow us to reconstruct the history of these thick disks and unveil the internal or external origin, complementing our findings with results from the literature of numerical simulations of galaxies of similar masses. Through the comparison between galaxies with a morphological structure with two distinct disks of different thicknesses and galaxies with only one disk, we will investigate mechanisms leading to or preventing the formation of a double-disk structure and discuss stellar formation history results in terms of formation models of disk structures.