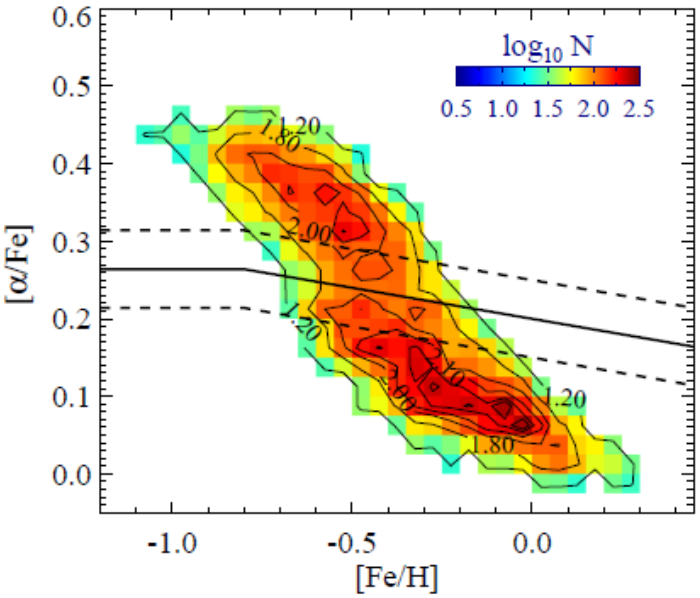
Joint Institute for Nuclear Astrophysics

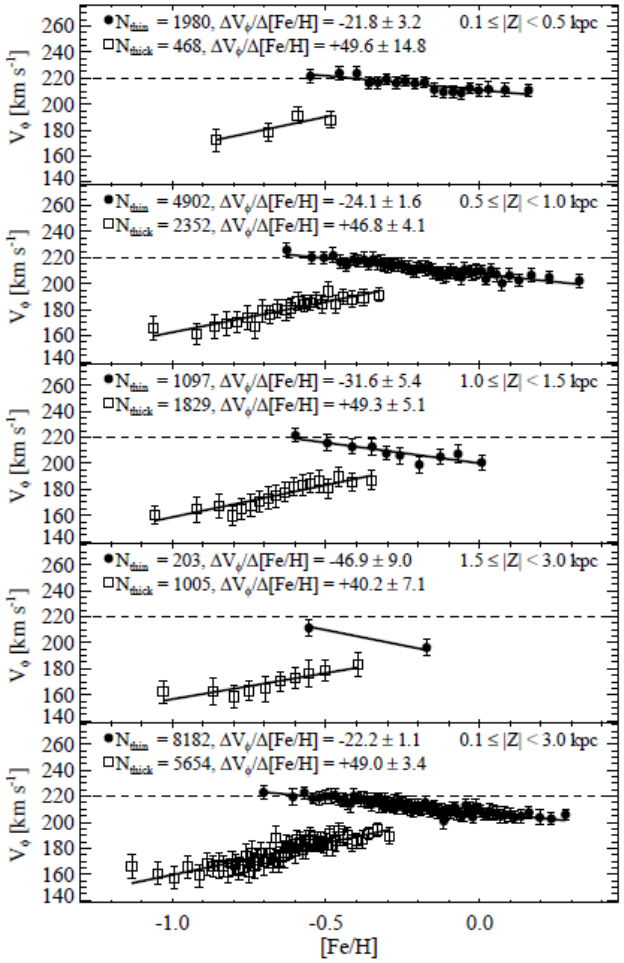
Formation and Evolution of the Disk System of the Milky Way: [α/Fe] Ratios and Kinematics of the SEGUE G-Dwarf Sample

The SEGUE Stellar Parameter Pipeline (SSPP) developed by JINA researchers and their colleagues is now able to obtain accurate estimates of the ratios of alpha-particle capture elements relative to iron, [α/Fe], which is a sharp diagnostic tool for tracing the origin of individual stellar populations. As a first application, JINA postdoctoral researcher Young Sun Lee has led a team that has analyzed a sample of over 17,000 G-type dwarf stars from SDSS/SEGUE sampling the thin- and thick-disk stellar populations.



Logarithmic density plot of the [α/Fe] vs. [Fe/H] plane, for over 10000 thin- and thick-disk stars with spectra from the SEGUE follow-up. Note that the distribution appears clearly bimodal. This bimodality well separates thin-disk stars with low-[α/Fe] from thick-disk stars with high-[α/Fe] stars. This separation can be used to independently study the kinematics of these components, and distinguish between alternative formation scenarios.

See the published work: Lee et al. (2011) ApJ 738, 187



Rotational velocity gradients with metallicity for different slices in distance from the Galactic plane, for stars assigned to the thin-disk (black dots) and thick-disk (open squares) populations. Each dot represents an average of 100 stars. Note that the kinematic behavior of these components is very different, as is their likely origin.

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