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Untangling Galactic History in Action Space ROBYN SANDERSON, JOHN BOCHANSKI, MIT, ANDREW WEST, Boston University, ADAM BURGASSER, UCSD, JAMES BINNEY, Rudolph Peierls Center for Theoretical Physics, Oxford University — Action-angle variables provide an instructive alternative viewpoint for studying the dynamical properties of objects in our Galaxy. Using a numerical method that constructs actions in an axisymmetric potential fit to the rotation curve of the Milky Way, we determine the locations in action space of two samples of stars from the SDSS survey for which complete six-dimensional phase space information is available: a small sample of ultra-cool dwarfs thought to include a large proportion of halo stars, and a large sample of M dwarfs that includes both disk and halo stars. We use this technique to examine the orbits of halo stars, compare the dynamical properties of the Milky Way thin and thick disks, and search for moving groups. We also demonstrate how observational errors and selection functions may be projected into action space, and forecast the performance of our method for next-generation astrometric surveys.

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