Z111a Subaru PFS Mock Observations of Satellites in a Cosmological Zoom-in Simulation of a Milky Way-like Galaxy

Yutaka Hirai (Univ. of Notre Dame, Tohoku Univ.), Evan N. Kirby, Borja Anguiano, Timothy C. Beers (Univ. of Notre Dame), Masashi Chiba (Tohoku Univ.), Kohei Hayashi (Sendai College, Tohoku Univ., Univ. of Tokyo), Takayuki R. Saitoh (Kobe Univ.), Miho N. Ishigaki (NAOJ)

The chemical abundances of Milky Way's satellites reflect their star-formation histories (SFHs). Due to the difficulty of determining the ages of old stars, the SFHs of most satellites are poorly measured. Subaru PFS can obtain around 10 times more medium-resolution spectra for stars in satellites than are currently available. To correctly extract SFHs from large samples of chemical abundances, the relationship between chemical abundances and SFHs needs to be clarified. Here, we performed a cosmological zoom-in simulation of a Milky Way-like galaxy and applied PFS mock observations of simulated stars in a Sculptor-like dwarf satellite. We find that it shows SF episodes separated by $\sim$100 Myr. Each SF event forms groups of stars with different [α/Fe] vs. [Fe/H]. We then apply a stellar-evolution model to compute the magnitudes of simulated stars. Based on the magnitudes, we compute the expected uncertainties of PFS observations. From this mock observation, we find that PFS will be able to detect distinct groups of stars in [α/Fe] vs. [Fe/H] space, formed in a different peak of SF separated with $\sim$100 Myr. These peaks are typically separated by 0.5 dex and 0.4 dex in [Fe/H] and very metal-poor stars' [α/Fe], respectively. This result means that SFHs with timescales of $\sim$100 Myr can be estimated from the chemical abundances of satellites observed in Subaru PFS.