

Z102r Galactic Archaeology with Subaru PFS

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PFS will dedicate approximately 140 nights to study the structure and evolution of galaxies in the Local Group. This galactic archaeological survey will have three pillars. (1) We will determine whether the mass density profiles of dwarf galaxies are consistent with cusps, as expected for cold dark matter, or cores, as expected from alternative dark matter theories or baryonic feedback. We will deduce the density profiles as a function of radius from Jeans modeling of the full line-of-sight velocity distributions for six dwarf galaxies. Our total sample will consist of 40,000 member stars. (2) From measurements of the $[\alpha/\text{Fe}]$ abundance ratio, we will learn the difference in assembly history of the two most massive galaxies in the Local Group: M31 and the Milky Way. We will observe 30,000 member stars over 45 square degrees of M31's halo and outer disk. (3) We will uncover how the most fragile part of the Milky Way responded to accretion events in the distant past (like Gaia-Enceladus Sausage) and in recent history (like Sagittarius). To support this study, PFS will provide velocities and metallicities – from which we will deduce ages – for tens of thousands of stars out to a Galactocentric distance of 30 kpc.