Galaxies at High Redshift and Their Evolution Over Cosmic Time
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Prime Focus Spectrograph: A very wide-field, massively multiplexed, optical & near-infrared spectrograph for Subaru Telescope

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Abstract. This short article is about Prime Focus Spectrograph (PFS), a very wide-field, massively-multiplexed, and optical & near-infrared (NIR) spectrograph as a next generation facility instrument on Subaru Telescope. More details and updates are available on the PFS official website (http://pfs.ipmu.jp), blog (http://pfs.ipmu.jp/blog/), and references therein.

The project, instrument, & timeline

PFS will position 2400 fibers to science targets or blank sky in the 1.3 degree field on the Subaru prime focus. These fibers will be quickly (∼60sec) reconfigurable and feed the photons during exposures to the Spectrograph System (SpS). SpS consists of 4 modules each of which accommodate ∼ 600 fibers and deliver spectral images ranging from 380nm to 1260nm simultaneously at one exposure via the 3 arms of blue, red, and NIR cameras. The instrument development has been undertaken by the international collaboration at the initiative of Kavli IPMU. The project is now going into the construction phase aiming at system integration and on-sky engineering observations in 2017-2018, and science operation in 2019.

The survey design has also been under development envisioning a survey spanning ∼300 nights over ∼5 years in the framework of Subaru Strategic Program (SSP). The key science areas are: Cosmology, galaxy/AGN evolution, and Galactic Archaeology (GA) (Takada et al. 2014). The cosmology program will be to constrain the nature of dark energy via a survey of emission line galaxies over a comoving volume of 10 Gpc^3 at $z = 0.8 - 2.4$. In the galaxy/AGN program, the wide wavelength coverage of PFS as well as the large field of view will be exploited to characterize the galaxy populations and its clustering properties over a wide redshift range. A survey of color-selected galaxies/AGN at $z = 1 - 2$ will be conducted over 20 square degrees yielding a fair sample of galaxies with stellar masses down to $\sim 10^{10} M_{\odot}$. In the GA program, radial velocities and chemical abundances of stars in the Milky Way, dwarf spheroids, and M31 will be used to understand the past assembly histories of those galaxies and the structures of their dark matter halos. Spectra will be taken for 1 million stars as faint as $V = 22$ mag therefore out to large distances from the Sun.

PFS will provide powerful spectroscopic capabilities even in the era of Euclid, LSST, WFIRST and TMT, and the effective synergies are expected for further unique science outputs.

Keywords. Keyword1, keyword2, keyword3, etc.

Reference

Takada, M., *et al.* 2014, *PASJ*, 66, 1