X15a **Subaru/FMOS survey of star formation galaxies at $z \sim 1.5$ in COSMOS**

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It has become clear that in the epoch of $z \sim$ 1-3 the star formation rate density became highest in the cosmological time scale. Crucial steps forward are to clarify what drive star formation in galaxies in this epoch and to disentangle relations between the star formation rate of galaxies and both internal and external properties, such as their mass, environment, metallicity and so on. A Recent study (Peng *et al*, 2010) shows the differential effects of stellar mass and environment on galaxy evolution up to $z \sim 1$ based on large optical spectroscopic surveys such as SDSS and zCOSMOS. However, the epoch $1.4 \lesssim z \lesssim 2$, which is called as "the redshift desert", has not been searched sufficiently. One of the impediments is the lack of strong emission lines falling within the optical window. Subaru/FMOS(Fiber Multi-Object Spectrograph) enables us to spectroscopically survey ~ 200 galaxies at an exposure in the near-infrared band. Some strong emission lines such as Hα and [NII] are falling within the NIR window if the galaxy exists at $z \sim 1.5$. We observed photo-z selected galaxies in the COSMOS field at an epoch ($1.4 \lesssim z \lesssim 1.7$) of rapid galaxy formation using FMOS, and obtain spectra of about 160 galaxies for which fiducial Hα emissions have been detected. From these spectra, we obtain the accurate redshift and measure the star formation rate based on the Hα line flux and the ratio of [NII]/Hα less impacted by dust extinction. In this talk, we overview our project, show the relation between the star formation rate of galaxies and their existing stellar mass, and discuss the galaxy evolution at this period.