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Recent studies suggest that faint active galactic nuclei may be responsible for the reionization of the universe. Confirmation of this scenario requires spectroscopic identification of faint quasars (M_{1450} > -24 mag) at z > 6, but only a very small number of such quasars have been spectroscopically identified so far. Here, we report the discovery of a faint quasar IMS J220417.92+011144.8 at z ~ 6 in a 12.5 deg^2 region of the SA22 field of the Infrared Medium-deep Survey (IMS). The spectrum of the quasar shows a sharp break at ~8443Å, with emission lines redshifted to z = 5.944 ± 0.002 and rest-frame ultraviolet continuum magnitude M_{1450} = -23.59 ± 0.10 AB mag. The discovery of IMS J220417.92+011144.8 is consistent with the expected number of quasars at z ~6 estimated from quasar luminosity functions based on previous observations of spectroscopically identified low-luminosity quasars. This suggest that the number of M_{1450} ~ -23 mag quasars at z ~ 6 may not be high enough to fully account for the reionization of the universe. In addition, our study demonstrates that faint quasars in the early universe can be identified effectively with a moderately wide and deep near-infrared survey such as the IMS.

[구 GC-19] GRB 140304A at z=5.283: Implications on the high redshift universe and the observed flaring activities

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Gamma ray burst, the most brightest explosion phenomena in the current universe is well suited for study of high redshift universe. We report the afterglow multi-wavelength observation and GTC spectroscopy follow up of GRB 140304A which was exploded at z=5.283. The spectrum was shown damped Lyman alpha features and a series of absorption lines S, Si, SiII*, Oi, CII, CII*, SiIV are clearly detected at common redshift. Clear optical flares are detected when X-ray flare happened and a possible gamma-ray excess also. At this conference, we report on implications for the GRB host and environments using its absorption features which place the results in context to other well studied high redshift GRBs and studies about the ejecta using its observed flaring activities.

[구 GC-20] Study on mapping of dark matter clustering from real space to redshift space

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The mapping of dark matter clustering from real to redshift spaces introduces the anisotropic property to the measured density power spectrum in redshift space, known as the Redshift Space Distortion (hereafter RSD) effect. The mapping formula is intrinsically non-linear, which is complicated by the higher order polynomials due to the indefinite cross correlations between the density and velocity fields, and the Finger-of-God (hereafter FoG) effect due to the randomness of the peculiar velocity field. Furthermore, the rigorous test of this mapping formula is contaminated by the unknown non-linearity of the density and velocity fields, including their auto- and cross-correlations, for calculating which our theoretical calculation breaks down beyond some scales. Whilst the full higher order polynomials remains unknown, the other systematics can be controlled consistently within the same order truncation in the expansion of the mapping formula, as shown in this paper. The systematic due to the unknown non-linear density and velocity fields is removed by separately measuring all terms in the expansion using simulations. The uncertainty caused by the velocity randomness is controlled by splitting the FoG term into two pieces, 1) the non-local FoG term being independent of the separation vector between two different points, and 2) the local FoG term appearing as an indefinite polynomials which is expanded in the same order as all other perturbative polynomials. Using 100 realizations of simulations, we find that the best fitted non-local FoG function is Gaussian, with only one scale-independent free parameter, and that our new mapping formulation accurately reproduces the observed power spectrum in redshift space at the smallest scales by far, up to k ~ 0.3 h/Mpc , considering the resolution of future experiments.