

Protoclusters at $z \sim 3 - 6$ Probed by Wide-field Imaging

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Abstract

We will present our systematic search for galaxy protoclusters at $z \sim 3-6$. Protoclusters provide a great deal of information of early stage of cluster formation in large-scale structure and environmental effects on galaxy evolution. We investigated sky distributions of $z \sim 3-6$ galaxies, selected by the dropout technique, in wide fields of the CFHT Legacy Survey Deep Fields and identified eighteen protocluster candidates. We have carried out follow-up spectroscopies on eight of these candidates (two candidates were observed at each redshift) by using the Subaru, Keck, and Gemini telescopes. We could confirm that some actual clustering structures in narrow redshift range by detecting their Ly α emissions, even at $z \sim 6$. These discoveries were achieved in “random fields”; that is, QSOs or radio galaxies were not used as protocluster probes. Based on these systematic observations, we will discuss structure evolution in protoclusters and possible different properties of protocluster galaxies from field galaxies from $z \sim 6$ to $z \sim 3$ by comparing with theoretical model.