Candidate High Redshift Clusters Around Radio Loud Quasars

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We report results of an r and K band imaging survey of radio-loud quasars (RLQs) at z = 0.6-2.0.

It is known that the environments of luminous RLQs evolve rapidly with redshift: at z=0.6 such RLQs are often found in Abell richness 0-1 clusters, but at z>0.5 they are never found in such rich environments. This indicates that the evolution of quasars is tied to their environments. The outstanding feature of quasar evolution is the huge decline in space density from z=2 to z=0, but almost nothing is known of quasar environments at z>0.7. To investigate RLQ environments to high redshift and to assemble and study a sample of high-redshift galaxies, we have searched for galaxies and clusters around a carefully selected sample of RLQs with 0.6<z<2.0.

Candidate clusters are detected by a contrast in the number density and/or color of galaxies around the quasars. Several clusters of Abell richness 0-1 have been found at z<1, and five at z=1.4-1.7. All z=1.5 candidates include extremely red galaxies with colors consistent with early-type galaxies already >3 Gyr old. Such galaxies can potentially constrain the cosmology by requiring high ages for the universe at large lookback times.

These candidate z=1.5 clusters are being studied in detail with ongoing multicolor imaging, upcoming optical and IR spectroscopy, and proposed HST observations. These data will provide photometric and spectroscopic redshifts and will measure the color, color-magnitude slope, and scatter in the "red envelope" of early-type galaxies in the color-magnitude diagram and thus constrain the formation epoch, differential evolution, and coevolution of such galaxies, respectively, within a cluster and between different clusters at z~1.5. These z=1.5 cluster candidates provide excellent tests of the coevolution of early-type cluster galaxies, since such tests are more sensitive the closer to the formation epoch they are performed.

Session 11: AGN
Display Session, 9:20am-6:30pm
Metropolitan Ballroom

Ultraviolet Variability in Active Galaxies: A Systematic Survey of the IUE Archives

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Now that the mission of IUE has been completed, the Colorado IUEAGN group is using the TOMSIPS software to systematically re-extract all of the AGN data in the archives. The spectra are then fitted with a multi-parameter model in order to measure continuum and line fluxes. We then compile a database of fluxes in a number of bands for each observation.

In this talk, we present continuum variability data for all AGN with at least 12 SWP observations. These data are generally sensitive to long-term variations, as the IUE satellite was operational for almost 20 yr. For certain objects that were the subjects of intensive monitoring campaigns (e.g., NGC 5548, NGC 4151, etc.), shorter time scale data also exist.

We will report the results of a number of studies. First, for individual well-observed objects, we determine the relation between variability amplitude and wavelength, on both long and short time scales. Second, for entire classes of objects (e.g., Seyfert 1.5, BL Lacs), we measure the correlation between mean object luminosity and variability amplitude. Finally, we compare the variability properties of different classes of objects.