EVOLUTION OF QUASAR CLUSTERING

A. Iovino and P. Shaver
European Southern Observatory
Karl-Schwarzschild-Str. 2
D-8046 Garching bei München
Federal Republic of Germany

Using three deep samples of quasars, we have found strong evidence for quasar clustering and its evolution.

The samples used, totalling 371 quasars, are the following: Boyle (1986, Ph.D. thesis, University of Durham): 171 UVX quasars, area 4 sq. deg., mag. lim. B=20.9; Crampton et al. (1987, Ap. J., 314, 129): 125 grens quasars, area 5.2 sq. deg., mag. lim. B=20.5; Barbieri et al. (A&A, to be submitted): 80 UVX quasars, area 10 sq. deg., mag. lim. B=19.5. The redshift distribution of the three samples is quite smooth, and the surface density distribution is essentially constant over the fields, except for the Barbieri et al. sample, where there is some indication of mild ($\lesssim$ 25%) vignetting. The correlation function method has been used to analyze the samples. Many random simulations were made for each of them, exactly reproducing both the redshift distribution and the angular distribution of the real data. These samples have then been used to evaluate ξ according to the usual formulae (Peebles, 1980, The Large-Scale Structure of the Universe, Princeton Series in Physics).

We have found evidence for clustering of quasars at low redshifts, up to comoving scales of $10h^{-1}$ Mpc (15 pairs found instead of the 4.7 expected, with $z<1.5$). By contrast there is no indication of clustering in the high redshift bin (5 pairs found instead of the 4 expected with $z>1.5$, up to $10h^{-1}$ Mpc). Thus, there is evidence for the evolution of clustering (the difference between these two results is significant at the 2.4σ level) (cf. fig. 1 and fig. 2 of Shaver, in this book).

The amplitude of the correlation function for quasars at low redshifts is similar to that expected for clusters. This is consistent with a picture in which quasars are located in rich environments, where they may perhaps be triggered by interactions. If indeed the clustering of quasars reflects that of clusters, then its evolution may be that of the large-scale structure of the universe itself.

J. Audouze et al. (eds.), Large Scale Structures of the Universe, 572.