

Large-Scale Structure in the Distribution of Galaxies

Mapping the Large-Scale Structure

The nearby galaxy distribution suggests a remarkable structure in which large voids are delineated by dense walls of galaxies in a cell-like pattern. The nearby voids range in diameter from ~ 10 to $\sim 50 h^{-1}$ Mpc (with a Hubble constant of $100 h$ km/s/Mpc). Deeper surveys appear to be consistent with the nearby distribution and show no evidence of voids larger than $\sim 100 h^{-1}$ Mpc. We might thus have reached the scale where the universe becomes homogeneous. The size of the largest inhomogeneities in the galaxy distribution is an important issue because it can put tight constraints on the theoretical models when confronted to the high degree of isotropy of the microwave background radiation.

Although deep pencil-beam surveys are best suited for probing a large number of voids and walls, understanding the nature of the intercepted peaks and valleys in terms of large-scale structure requires that the angular coverage of the surveys be larger than the galaxy auto-correlation length. If this condition is not satisfied, the size of the voids and the density contrast of the walls can be overestimated.

These considerations emphasize the need for systematic redshift surveys over significant areas of the sky out to intermediate and large distances. Medium size telescopes with wide-field CCD imaging capabilities will be important tools for providing the necessary galaxy catalogues.

Valerie de Lapparent
Institut d'Astrophysique de Paris
98 bis Boulevard Arago, 75014 Paris, France

Large-Scale Structure in the Durham/UKST Galaxy Redshift Survey

Here we report on the progress of the compilation and analysis of the Durham/UKST galaxy redshift survey. This survey will cover a large contiguous area of sky in the SGP region and contain redshifts of some 4000 galaxies of $b_j < 17^m$ providing detailed topological information about the structure of the Universe on large scales. Large features on scales of $\sim 100h^{-1}$ Mpc are clearly visible on examination of the completed section of the survey although a statistical analysis of the survey by means of the two-point correlation function is close to zero on scales of $r > 10h^{-1}$ Mpc.

A. Broadbent, T. Shanks, R. Fong and C.A. Collins
Physics Dept, University of Durham
South Road, Durham, DH1 3LE, UK

F.G. Watson and A.P. Oates
Royal Greenwich Observatory
Madingley Road, Cambridge CB3 0HA, UK

Q.A. Parker
Royal Observatory
Blackford Hill, Edinburgh EH9 3HJ, UK

A Redshift Survey to $b_j \leq 19.4$ in the Southern Sky

In September 1991 we started a galaxy redshift survey over a strip $22^\circ \times 1.5^\circ$ (plus a nearby area $5^\circ \times 1.5^\circ$, five degrees west of the strip) in the South Galactic Pole region. We plan to fill this area with a regular grid of circular fields with a diameter of 32 arcminutes. This size corresponds to the field of view of the multifiber spectrograph (OPTOPUS) we use at the ESO 3.6m telescope, which allows us to observe 46 galaxies (plus four skies) at one time.

The limiting magnitude of the survey is $b_j \leq 19.4$ and the target objects have been selected from the Edinburgh-Durham Southern Sky Galaxy Catalogue.

Up to now we have observed 76 fields and fully reduced data for 47 fields in the first strip (90% coverage) and 16 in the second strip, covering about 12 square degrees and totalling about 2000 galaxy redshifts.

Some preliminary results will be shown, among these:

- 1) A new determination of the galaxy luminosity function;
- 2) The statistical properties of emission lines galaxies, with particular emphasis on the OII $\lambda 3727$ equivalent widths distribution (which traces the star formation rate).

G. Vettolani and E. Zucca
Istituto di Radioastronomia del CNR, Bologna, Italy

A. Cappi, R. Merighi, M. Mignoli, G. Stirpe and G. Zamorani
Osservatorio Astronomico di Bologna, Italy

C. Collins and H. MacGillivray
Royal Observatory, Edinburgh, UK

C. Balkowski, J. Alimi, A. Blanchard, V. Cayatte, S. Maurogordato and D. Proust
DAEC, Observatoire de Paris-Meudon, Meudon, France

G. Chincarini and L. Guzzo
Osservatorio Astronomico di Brera, Milano, Italy

D. Maccagni
Istituto di Fisica Cosmica e Tecnologie Relative
Milano, Italy

R. Scaramella
Osservatorio di Roma, Monteporzio Catone
Italy

M. Ramella
Osservatorio Astronomico di Trieste, Italy

Search for Faint Galaxies towards Nearby Voids

Recent large-field redshift surveys, all based on intrinsically bright galaxies, have revealed a cellular structure of the nearby universe, where large voids are surrounded by sheet-like concentrations of galaxies. This picture may depend on observational bias. Here, we present a search for intrinsically faint galaxies towards three nearby voids, where we tried to overcome at least some of the bias inherent in the available surveys. We tested three strategies, namely searching candidates on the old Palomar Sky Survey Prints, and searching such objects on Prime focus images of the Calar Alto 3.5 m telescope. While the Prime focus images have a relatively small field (1 square degree for plates, 35 square arcmin for CCD), they have better resolution and deeper limiting magnitudes than the POSS plates. Follow-up spectroscopy was obtained in all cases. We will describe our observations, their reductions, and their relative efficiency in finding galaxies within the expected redshift range.

Ulrich Hopp, Kurt Birkle, Hans Elsässer, Bernd Kuhn and Ulrich Thiele
MPI für Astronomie, Heidelberg, Germany