

## THE CROSS-CORRELATION OF ABELL CLUSTERS WITH THE LICK GALAXY COUNTS

Per B. Lilje and G. Efstathiou

Institute of Astronomy, Madingley Road, Cambridge CB3 0HA, UK

We have analysed the cross-correlations between Abell clusters and the 10'x10' Lick galaxy counts. The main new features of our analysis are as follows: (a) we correct for gradients in the Lick counts that depend only on galactic latitude; (b) we check the effects of applying a filter to remove (likely artificial) gradients on scales  $>20^\circ$ ; (c) redshifts for Abell clusters are used to compute a cross-correlation function  $w_{cg}(\sigma)$ , where  $\sigma = v\phi/H_0$  is the projected separation between a cluster with recession speed  $v$  and a galaxy at angular distance  $\phi$  from the cluster centre; (d) the amplitude of the spatial cross-correlation function  $\xi_{cg}(r)$  is estimated using modern determinations of the galaxy luminosity function. Our results show that the shape of  $\xi_{cg}$  is reasonably well determined on scales  $r \lesssim 20h^{-1}$  Mpc. On larger scales, the results depend sensitively on the corrections for large-scale gradients in the Lick counts. The results based on  $w_{cg}(\sigma)$  are well described by a power-law model  $\xi_{cg}(r) \approx (r/8.8h^{-1} \text{ Mpc})^{-2.2}$ , while the angular cross-correlations for Abell clusters in distance class  $D=5$  are better described by the model  $\xi_{cg}(r) \approx (r/6h^{-1} \text{ Mpc})^{-2.3} + (r/7h^{-1} \text{ Mpc})^{-1.7}$ . Seldner and Peebles (1977) derived a larger amplitude for  $\xi_{cg}$  because they assumed a different luminosity function. We compare these results with theoretical predictions of  $\xi_{cg}$  in the  $\Omega=1$  biased cold dark matter (CDM) model. On scales  $1 h^{-1} \text{ Mpc} \lesssim r \lesssim 10 h^{-1} \text{ Mpc}$ , the theoretical predictions for  $\xi_{cg}$  are in surprisingly good agreement with our observational estimates. On smaller scales, the CDM model gives too high an amplitude whereas on larger scales the predicted amplitude is too low. Neither of these discrepancies is particularly serious.

For details of this analysis, see Lilje and Efstathiou (1987).

### REFERENCES

- Lilje, P.B. and Efstathiou, G. 1987, MNRAS, submitted.  
Seldner, M. and Peebles, P.J.E. 1977, Ap. J. 215, 703.