THE URSA MAJOR SUPERCLUSTER

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The Ursa Major supercluster is an association of ten Abell clusters which lie within 7° of each other. The center of the system has equatorial coordinates RA $11^h\ 39^m$, Dec 54°.5 (1950.0) and galactic coordinates $\ell = 143°$, $b = 60°$.

The observational work consists of an optical and a radio survey. The optical observations consist of a spectroscopic survey in which redshift data for cluster galaxies and optical identifications of radio sources were obtained with the 98-inch Isaac Newton telescope at the Royal Greenwich Observatory, and the 200-inch Hale telescope; the photographic survey in B, V and R colors was made with the 48-inch Schmidt telescope at Palomar. The reduction of these plates is under way with the use of a computer-controlled PDS which has just become operational at CNPq-ON. For the analysis of the two-dimensional galaxy distribution counts of the new statistically-corrected Shane and Wirtanen Catalogue, plate numbers 1066 and 1067 were used.

The main conclusions of these surveys may be summarized as follows: the two-dimensional distribution of galaxies over the supercluster region is very complex; the rich clusters of galaxies are highly asymmetrical, the cluster A1377 possibly being the most massive cluster in the system. There are many groups of galaxies scattered between the rich clusters of galaxies and in many of the regions between the rich clusters and groups of galaxies. The surface density of galaxies with $m_{pg} < 19$ is higher (~ 2) than the average background. Peebles' model to describe the overall distribution of galaxies in the universe is compatible with the analysis of the counts of the galaxies. The observed redshifts segregate into at least four distinct ranges: i) the Local Supercluster and foreground groups (~ 2500 km s^{-1}); ii) the major association of matter of the Ursa Major Supercluster ($\sim 19{,}700$ km s^{-1}); iii) background groups and clusters ($\sim 30{,}000$ km s^{-1}); iv) very distant groups and clusters ($\sim 41{,}000$ km s^{-1}). This result shows that the remarkable association of galaxies observed is partly produced by projection on the sky of physically independent systems, confirming the existence of large "voids" or gaps in the three-dimensional galaxy distribution, also well-demonstrated for regions around other superclusters such as Coma/A1367, Hercules and Perseus/Pisces. It is likely that the Ursa Major

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Supercluster is a physical system of four clusters, shown in the following table.

Cluster	<Z>	Mean Velocity <V> km.s^{-1}	Velocity Dispersion $\langle V^2 \rangle^{1/2}$ km.s^{-1}	Virial Mass $M_\odot$	No. of Observed Galaxies
A1291	0.0530	15885	975	1.4×10^{15}	7
A1318	0.0564	16923	284	1.2×10^{14}	4
A1377	0.0514	15431	488	3.5×10^{14}	8
A1383	0.0603	18102	395	2.3×10^{14}	5

There are also groups and field galaxies. The entire system has a mean velocity of 17,250 km.s^{-1}, velocity dispersion of 1193 km.s^{-1}, and a virial mass of 5.1×10^{15} $M_\odot$. It is 345 Mpc away, and has a projected radius of $\sim$ 10 Mpc. The crossing times are greater than the Hubble time, though there is observational evidence for strong gravitational interaction between the clusters and groups. The supercluster probably is a bound system that has not yet reached a stationary state. The system is embedded in a large association of matter with projected radius -24 Mpc. This association is evidently expanding with the Hubble flow.

The 5C10 survey is the tenth survey with the Cambridge One-Mile telescope at 408 and 1407 MHz simultaneously, and known collectively as the 5C surveys. The main conclusions of this survey may be summarized as follows: At 408 MHz a flux limit (before envelope correction) of 9.8 mJy (= 6σ, where σ = 1.63 mJy) was adopted, and the catalogue contains 265 sources above this level. At 1407 MHz, a limit of 1.7 mJy (= 5σ, where σ = 0.34 mJy) was adopted, and 48 sources are listed. Twenty-six sources appear extended and 12 of these are identified with galaxies. Four of the sources have radio-tail structure. At 408 MHz, 27 (11 percent) of the unresolved sources have been identified. When resolved sources are included, the total identification rate is 18 percent. At 1407 MHz, 41 percent (17 sources) of all sources have possible identifications. Six out of ten Abell clusters surveyed in 5C10 probably have radio sources in them. Sixteen 5C10 sources are associated with galaxies which are apparently in groups of galaxies. Of these, eight are in the magnitude range of 15 to 17, and presumably two may be related to the supercluster. About three percent of the galaxies in the Ursa Major supercluster have been detected as radio sources. The overall statistics of the 5C10 survey are not substantially biased by the presence of the supercluster. The distribution of radio spectral index for a combined sample of 5C surveys differs significantly from that for bright (2 Jy) sources. In the central cluster (A1318), 9 percent of the galaxies are detected as radio sources; its luminosity distribution is compatible with that of the Coma cluster. Intrinsically bright galaxies are more likely to be radio sources, and those in rich clusters are more likely than those in the general field of the supercluster or in groups.

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