THE ESO SLICE PROJECT (ESP) REDSHIFT SURVEY

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1. The ESO Slice Project Redshift Survey

The ESO Slice Project (ESP) is a galaxy redshift survey we have recently completed as an ESO Key-Project over about 30 square degrees, in a region near the South Galactic Pole (Vettolani *et al.*, submitted to A&A). The survey is nearly complete to the limiting magnitude $b_J = 19.4$ and consists of more than three thousands galaxies with reliable redshift determination.

The ESP survey is intermediate between shallow, wide angle samples and very deep, monodimensional pencil beams: spanning a volume of $\sim 10^5$ h^{-3} Mpc^3 at the sensitivity peak ($z \sim 0.1$) it can provide an accurate determination of the "local" luminosity function and the mean galaxy density (Zucca *et al.*, submitted to A&A). Moreover, it can allow clustering analyses not biased anymore by nearby structures. Finally, this uniform set of spectra will allow us interesting studies about the K-correction and the galaxy evolutionary properties, based on a large homogeneous sample.

Here we report some results about the luminosity function.

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2. The Luminosity Function

We find that, although a Schechter function (with $\alpha = -1.22$, $M^*_{b_J} = -19.61 + 5 \log h$ and $\phi^* = 0.020\ h^3\ \mathrm{Mpc}^{-3}$) is an acceptable representation of the luminosity function over the entire range of magnitudes ($M_{b_J} \leq -12.4 + 5 \log h$), our data strongly suggest a steepening of the luminosity function for $M_{b_J} \geq -17 + 5 \log h$. Such a steepening, well fitted by a power law with slope $\beta \sim 1.6$, is in agreement with what has been recently found by similar analyses for both field galaxies (Marzke *et al.* 1994) and galaxies in clusters (*e.g.*, Driver & Phillipps 1996).

This steepening at the faint end of the luminosity function is almost completely due to galaxies with emission lines: in fact dividing galaxies into two samples, *i.e.*, galaxies with and without emission lines, we find significant differences in their luminosity functions. In particular, galaxies with emission lines (which are $\sim 50\%$ of the total) show a steeper slope and a fainter M^*.

The normalization and the α and M^* parameters of our luminosity function are in excellent agreement with those of the AUTOFIB redshift survey (Ellis *et al.* 1996). Viceversa, our normalization is a factor ~ 2 higher than that found for both the APM (Loveday *et al.* 1992) and the Las Campanas (Lin *et al.* 1996) redshift surveys. Also the faint end slope of our luminosity function is significantly steeper than that found in these two surveys.

The galaxy number density for $M_{b_J} \leq -16 + 5 \log h$ is well determined ($\bar{n} = 0.08\ \ h^3\ \mathrm{Mpc}^{-3}$). Its estimate for $M_{b_J} \leq -12.4 + 5 \log h$ is more uncertain, ranging from $\bar{n} = 0.28\ \ h^3\ \mathrm{Mpc}^{-3}$, in the case of a fit with a single Schechter function, to $\bar{n} = 0.54\ \ h^3\ \mathrm{Mpc}^{-3}$, in the case of Schechter function and power law fit. The corresponding luminosity densities in these three cases are $\rho_{LUM} = (2.03, 2.23, 2.31) \times 10^8\ h\ \ \mathrm{L}_\odot\ \mathrm{Mpc}^{-3}$, respectively.

References

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