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The Effect of Galaxy Mergers in the Local Galaxy Population

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The luminosity function (LF) is one of the most fundamental quantities to be observed in Astronomy. It is determined by the combined effects of the various physical phenomena that drive galaxy formation and evolution, therefore it is a very useful tool to constrain cosmological models.

The determination of a very precise LF is possible today by using data from deep redshift surveys (e.g. SDSS – Abazajian *et al.* 2004; 2dF – Colless *et al.* 2001) joined with results of local galaxy surveys. Deep redshift surveys probe large volumes of the universe, providing large numbers of bright galaxies with very accurate photometry. Below magnitudes $M_R < -20$, however, these surveys by themselves do not appear to give a consistent measurement of the LF (Driver & de Propis 2003). At this magnitude range, other methods have to be employed to construct a LF: using compilations of volume-limited samples within the local universe (Tully 1988; Karachentsev *et al.* 2004) and mosaic CCD studies which provide deep LFs for nearby groups of galaxies (Trentham & Tully 2002).

Trentham *et al.* (2005) determined a comprehensive LF from $-24 < M_R < -9$ using a combination of the SDSS (Blanton *et al.* 2003) at the bright end and results from surveys of nearby groups at the faint end. Today, we are in a position to build a more sophisticated LF, by including new results and measurements for both local group faint galaxies and nearby group surveys. In this work we use similar techniques and consider a *range* of LFs constructed in different ways using different data available. Furthermore, we produce type specific LFs following different prescriptions – using neural networks applied to the SDSS, and using galaxy fractions from catalogues that rely on visual inspection.

The main goal of this work is to quantify the evolution of the LF, taking into account the processes that contribute to this evolution: (i) Passive stellar evolution; (ii) Quiescent star formation; (iii) Mergers of galaxies. For the local universe, we believe that mergers is the most important factor driving galaxy evolution, as mergers of stellar systems are the dominant physical processes at current time. Here we selected mergers from the SDSS using asymmetry criteria, and our final sample comprises around 300 candidates. Data for passive stellar evolution and quiescent star formation were obtained from the literature.

References

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