



# The Faint End of the Luminosity Function and Low Surface Brightness Galaxies

Margaret J. Geller, Antonaldo Diaferio, Michael J. Kurtz, Ian P. Dell'Antonio, Daniel G. Fabricant

(Submitted on 14 Jul 2011 (v1), last revised 9 Mar 2012 (this version, v2))

SHELS (Smithsonian Hectospec Lensing Survey) is a dense redshift survey covering a 4 square degree region to a limiting  $R = 20.6$ . In the construction of the galaxy catalog and in the acquisition of spectroscopic targets, we paid careful attention to the survey completeness for lower surface brightness dwarf galaxies. Thus, although the survey covers a small area, it is a robust basis for computation of the slope of the faint end of the galaxy luminosity function to a limiting  $M_R = -13.3 + 5 \log h$ . We calculate the faint end slope in the R-band for the subset of SHELS galaxies with redshifts in the range  $0.02 \leq z < 0.1$ , SHELS\_{0.1}. This sample contains 532 galaxies with  $R < 20.6$  and with a median surface brightness within the half light radius of  $SB_{\{50,R\}} = 21.82 \text{ mag arcsec}^{-2}$ . We used this sample to make one of the few direct measurements of the dependence of the faint end of the galaxy luminosity function on surface brightness. For the sample as a whole the faint end slope,  $\alpha = -1.31 \pm 0.04$ , is consistent with both the Blanton et al. (2005b) analysis of the SDSS and the Liu et al. (2008) analysis of the COSMOS field. This consistency is impressive given the very different approaches of these three surveys. A magnitude limited sample of 135 galaxies with optical spectroscopic redshifts with mean half-light surface brightness,  $SB_{\{50,R\}} \geq 22.5 \text{ mag arcsec}^{-2}$  is unique to SHELS\_{0.1}. The faint end slope is  $\alpha_{\{22.5\}} = -1.52 \pm 0.16$ . SHELS\_{0.1} shows that lower surface brightness objects dominate the faint end slope of the luminosity function in the field, underscoring the importance of surface brightness limits in evaluating measurements of the faint end slope and its evolution.

Comments: 34 pages, 13 figures, 3 tables, *Astronomical Journal*, in press (updated based on review)

Subjects: **Cosmology and Extragalactic Astrophysics (astro-ph.CO)**

Cite as: [arXiv:1107.2930](#) [astro-ph.CO]  
(or [arXiv:1107.2930v2](#) [astro-ph.CO] for this version)

## Download:

- [PDF](#)
- [PostScript](#)
- [Other formats](#)

Current browse context:

astro-ph.CO

[< prev](#) | [next >](#)

[new](#) | [recent](#) | [1107](#)

Change to browse by:

[astro-ph](#)

## References & Citations

- [INSPIRE HEP](#)  
([refers to](#) | [cited by](#))
- [NASA ADS](#)

## Bookmark (what is this?)



From: Margaret Geller [[view email](#)]

[\[v1\]](#) Thu, 14 Jul 2011 20:00:05 GMT (1467kb)

[\[v2\]](#) Fri, 9 Mar 2012 20:31:52 GMT (1750kb)

*[Which authors of this paper are endorsers?](#)*

Link back to: [arXiv](#), [form interface](#), [contact](#).