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THE EVOLUTION OF THE NEAR-IR LUMINOSITY FUNCTION FROM K20 SURVEY

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We present the galaxy rest-frame near-IR Luminosity Function (LF) in the J- and K_s-bands and their cosmic evolution to $z \sim 1.5$ based on the K20 spectroscopic survey (Pozzetti et al. 2002).

The study of faint near-infrared galaxy samples represents an important possibility to address the still open questions on the formation and evolution of massive systems. In this poster, we present the study of the evolution of the near-IR LF up to $z \simeq 1.5$ based on a spectroscopic survey of a complete sample of galaxies selected with $K_s < 20$ (the K20 survey; `http://www.arcetri.astro.it/~ k20/`). The survey and the redshift distribution are described in detail in Cimatti et al. (2002a, b). The K20 sample includes 489 galaxies. The spectroscopic redshift completeness is 85% for $K_s < 20$, and it increases to 98% if we include the photometric redshifts. We derive the near-IR luminosity function in the rest-frame J- and K_s-band in three redshift bins ($z_{mean} \simeq 0.5, 1.0, 1.5$) and compare them to the near-IR Local Luminosity Function (LLF) and with the predictions of Pure Luminosity Evolution (PLE) models and hierarchical merging models. We adopt $H_0 = 70$ Km s^{-1} Mpc^{-1}, $\Omega_m = 0.3, \Omega_\Lambda = 0.7$.

We found that the faint-end LFs ($L < L^*$) are consistent with the local estimates up to $z < 1.3$, whereas at the bright end the data show an excess of luminosity. The data are consistent with a *mild luminosity evolution* both in the J- and K_s-band up to $z \simeq 1.5$, with an amplitude of about $\Delta M_J \simeq -0.69 \pm 0.12$ and $\Delta M_K \simeq -0.54 \pm 0.12$ at $z \sim 1$. On the contrary, pure density evolution cannot reproduce the observed LF at $z \leq 1$. This suggests a slow evolution in the Galaxy Stellar Mass Function. Moreover, we found that the red and early-type galaxies dominate the bright-end of the LF, thus suggesting that massive galaxies were already in place at $z \simeq 1$. We also investigate the evolution of the near-IR comoving luminosity density to $z \simeq 1.5$, finding a slow evolution ($\rho_\lambda(z) = \rho_\lambda(z=0)(1+z)^{\beta(\lambda)}$ with $\beta(J) \simeq 0.70$ and $\beta(K_s) \simeq 0.37$). Finally, the comparison with the predictions of a set of the most updated models shows that the current renditions of hierarchical models overpredict significantly the density of low luminosity galaxies at $z \leq 1$, whereas passive evolution models are more consistent with the data up to $z \sim 1.5$. At $z > 1$ hierarchical models underpredict the density of luminous massive galaxies.

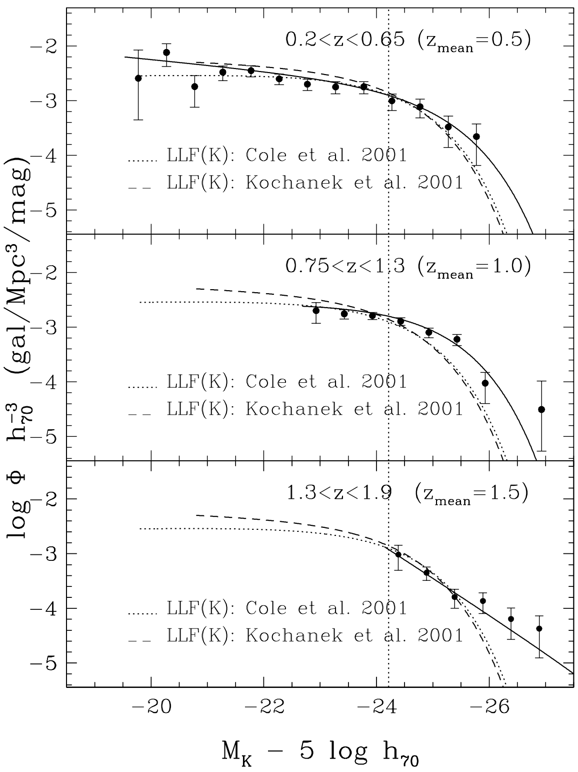

Fig. 1. The rest-frame K_s-band LF at $z_{mean} = 0.5$ (top) $z_{mean} = 1.0$ (middle) and $z_{mean} = 1.5$ (bottom panel). Points and solid curves derive from $1/V_{max}$ and maximum likelihood analysis. The dotted and dashed curves show the local LF.

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