Stellar Masses of Galaxies from MUNICS and FDF

The stellar mass assembly history of field galaxies is a powerful test of galaxy evolution models. Stellar masses can be derived by fitting composite stellar population (CSP) models (e.g. [2]) of varying age, star-formation history, metallicity and dust attenuation to the galaxies' optical and near-infrared broad-band photometry [1].

- We have tested this procedure by comparing stellar masses derived in this manner to masses from spectral features for SDSS galaxies [11]. The result is presented in Fig. 1 and shows good agreement between the two methods [7].
- Applying this to the near-infrared optical galaxy survey MUNICS [3, 5, 9, 13] and FDF [10, 12], we can derive the evolution of the stellar mass function of field galaxies with redshift, see Fig. 2 [4, 6], as well as the evolution of the total stellar mass density of the universe, see Fig. 3 [8].

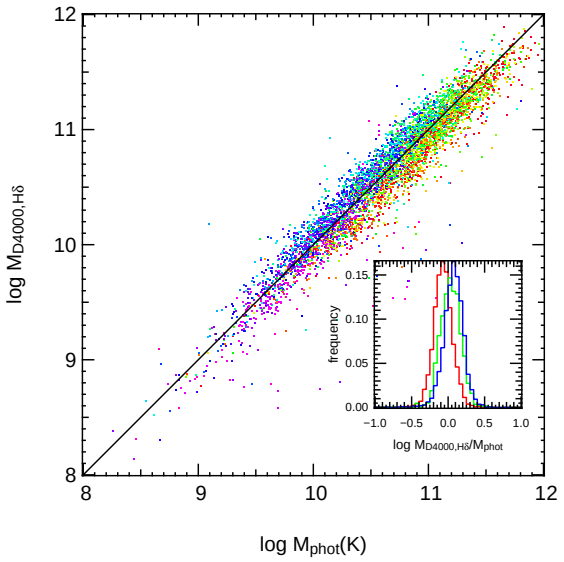

Fig. 1 *Comparison of stellar masses for SDSS galaxies derived from spectroscopic indices and from fitting CSP models to the broad-band photometry and then converting the K-band luminosity to stellar mass using M/L_K. The colours denote Hα equivalent width (a measure for the star-formation rate) from no emission (red) to strong emission (purple). The small panel shows a histogram of the residuals as a function of Hα equivalent width.*

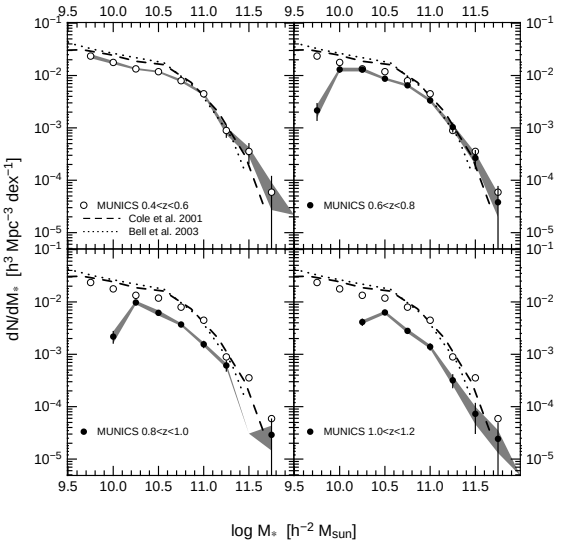

Fig. 2 *The evolution of the stellar mass function with redshift. The open and closed symbols are the MUNICS values at $0.4 < z < 0.6$ and at higher redshifts, respectively. The lowest z values are shown in all panels for comparison. Error bars denote the uncertainty due to Poisson statistics. The shaded areas show the 1 σ range of variation in the mass function given the total systematic uncertainty in M/L_K. The dotted and dashed lines show the $z = 0$ stellar mass function derived similarly to our methods using SDSS, 2dF, and 2MASS data.*

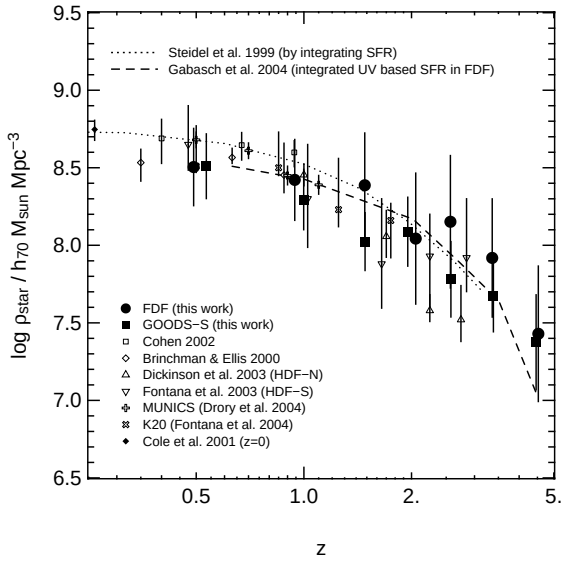

Fig. 3 *The evolution of the total stellar mass density in the universe. The closed circles are the MUNICS and FDF values, open symbols are values from the literature. The integrated star formation rate (derived from the UV luminosity, dotted and dashed curves) is shown for comparison.*

References:

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