6dFGS: Luminosity & Stellar Mass Functions

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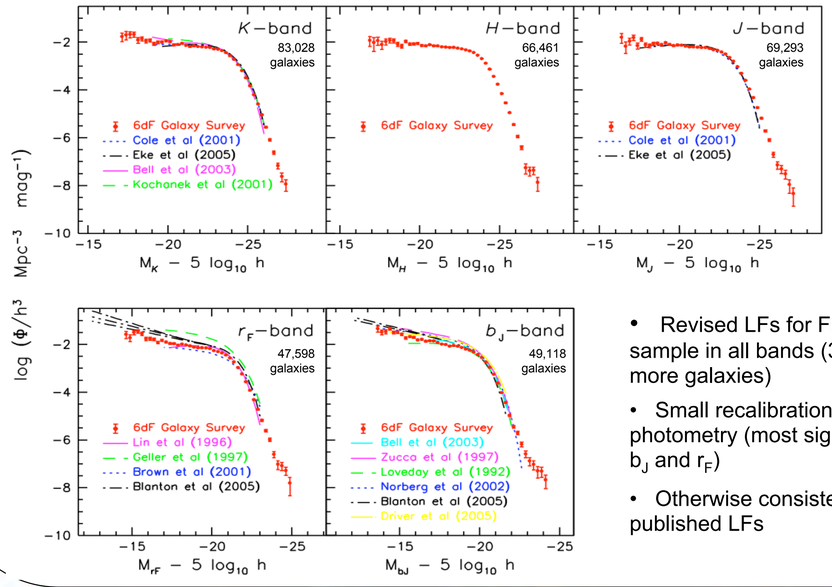
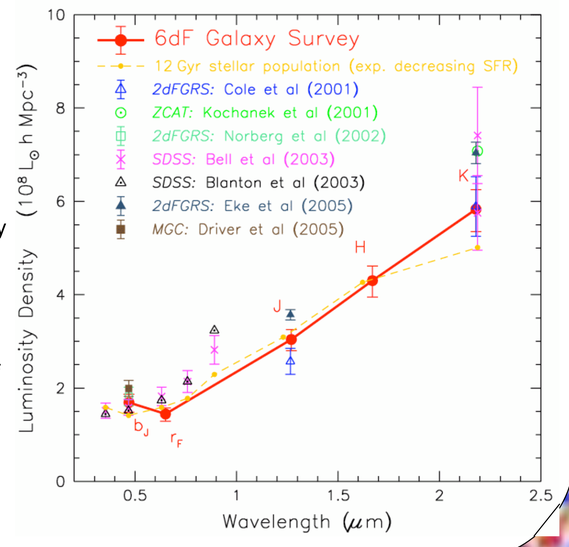
Final NIR and optical luminosity functions



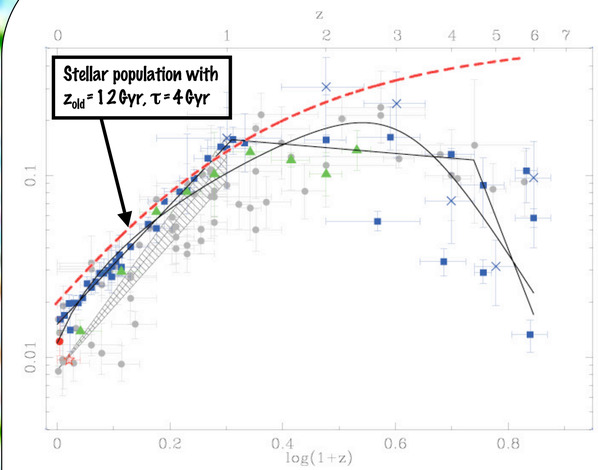
- Revised LFs for FINAL sample in all bands (30% more galaxies)
- Small recalibrations of the photometry (most significant in b_J and r_F)
- Otherwise consistent with published LFs

Luminosity density in the optical and NIR

- The luminosity densities in optical and NIR estimated from 6dFGS are broadly consistent with the 2dFGRS and SDSS results
- K-band luminosity density lies at lower end of range
- From optical to NIR, the variation of luminosity density with wavelength is consistent with models for an old stellar population



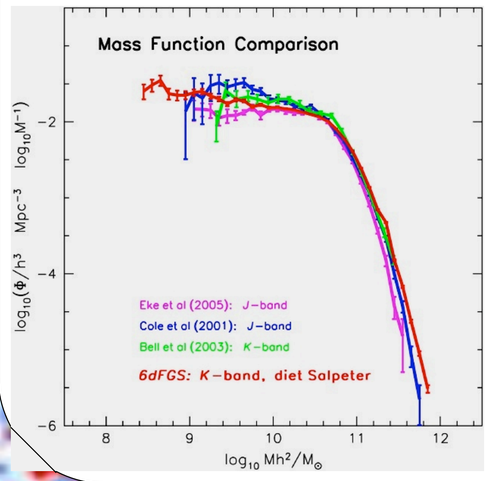
Cosmic star-formation history

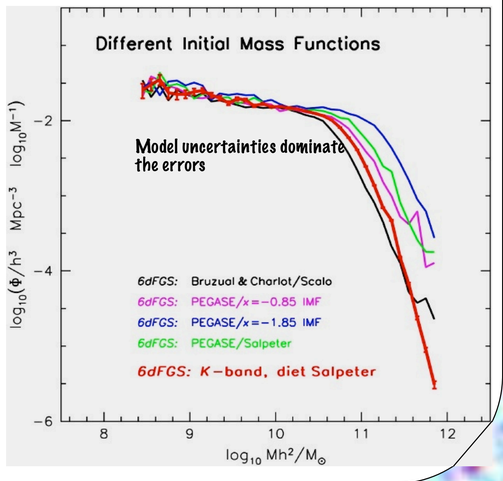


Given the observed star-formation history…
…is it consistent with the observed luminosity densities in optical and NIR bands?
…is it consistent with the observed total stellar mass in the present-day universe?

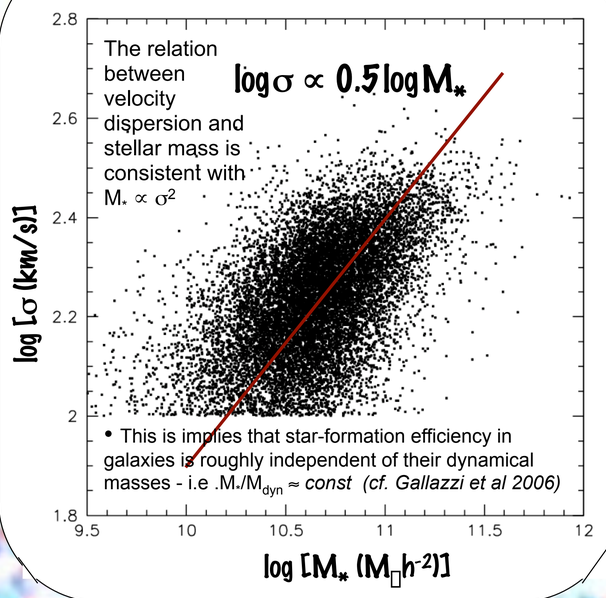
Stellar mass functions

- NIR luminosities are good proxies for the total stellar masses in galaxies, so we can estimate the stellar mass function from the K-band luminosity function…
- NIR light is dominated by the older and cooler stars comprising the bulk of the stellar mass
- NIR mass-to-light ratios are well constrained, and k-corrections & extinctions are smaller in NIR



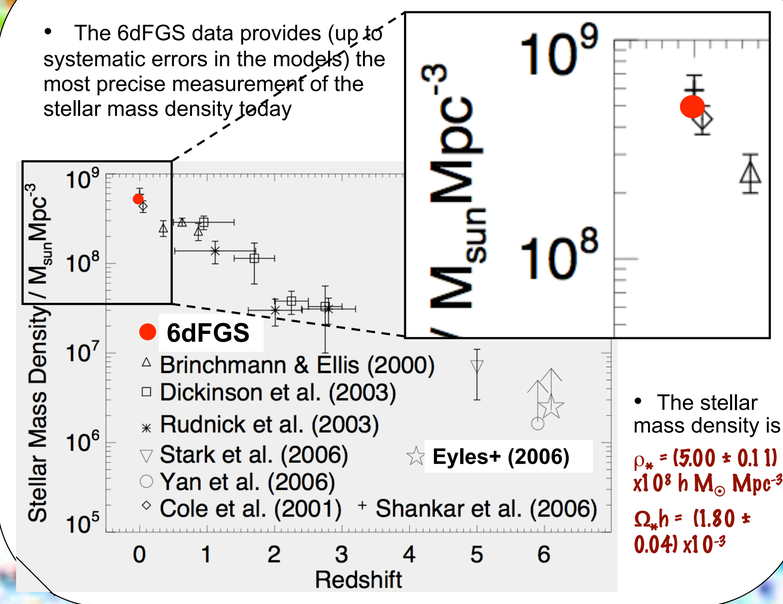


Stellar and dynamical masses



The present-day stellar mass density

- The 6dFGS data provides (up to systematic errors in the models) the most precise measurement of the stellar mass density today



- The stellar mass density is

$\rho_* = (5.00 \pm 0.11) \times 10^8\ h\ M_\odot\ Mpc^{-3}$

$\Omega_* h = (1.80 \pm 0.04) \times 10^{-3}$