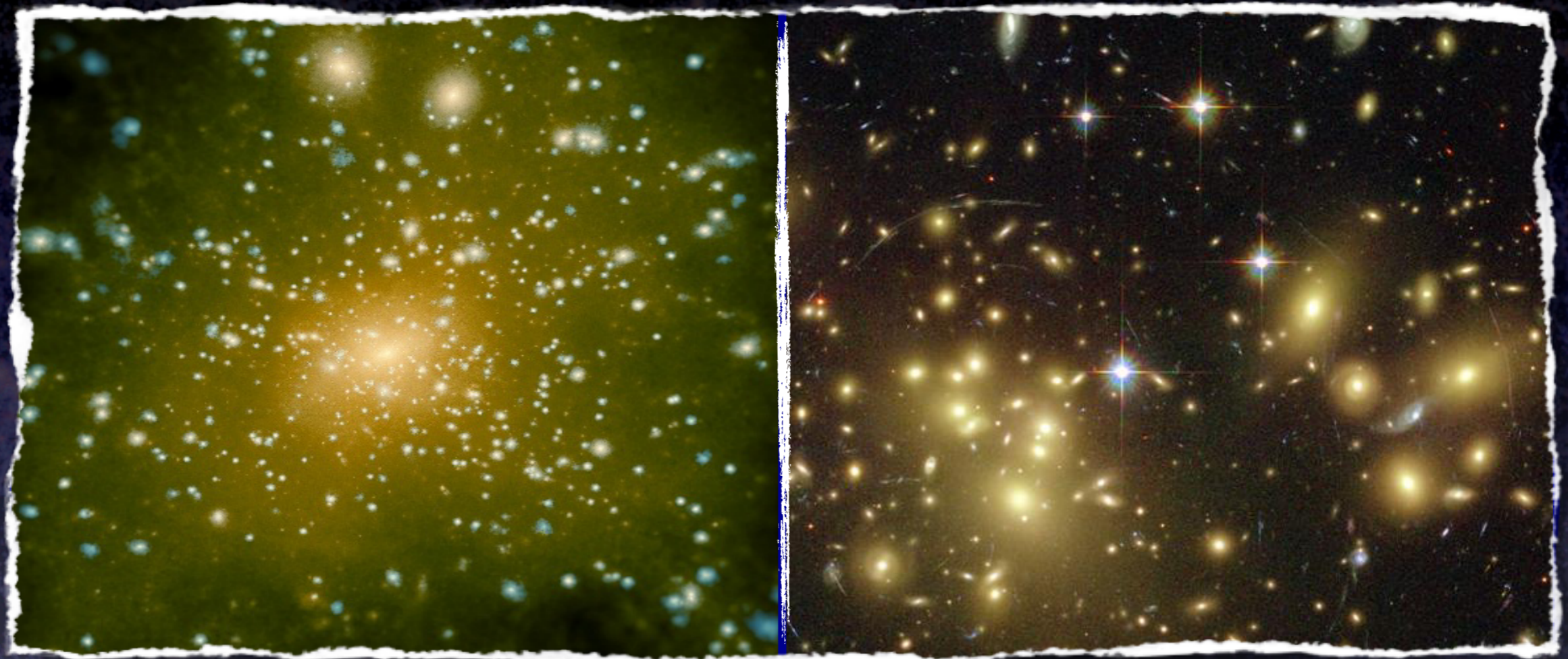


Evolution of the Galaxy-Dark Matter Connection & the Assembly of Galaxies in Dark Matter Haloes



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Yang et al. 2011 [arXiv:1110.1420]

Galaxy-Dark Matter Connection across Cosmic Time

Yang et al. 2011 [arXiv:1110.1420]

The Model

central galaxies

$$\Phi_c(M_*|M, z) = \frac{1}{2\pi\sigma_c} \text{EXP} \left[-\frac{(\log M_*/\bar{M}_*)^2}{2\sigma_c^2} \right] \quad \left. \begin{array}{l} \bar{M}_* = \bar{M}_*(M, z) \\ \sigma_c = \sigma_c(z) \end{array} \right\} \text{9 free parameters}$$

satellite galaxies are centrals at infall:

$$\Phi_s(M_*|M, z) = \int_0^\infty dM_{*,a} \int_0^M dm_a \int_z^\infty dz_a \int_0^M dM_a \int_0^1 d\eta \Phi_c(M_{*,a}|m_a, z_a) n_{\text{sub}}(m_a, z_a|M, z) \\ P(M_*, z|M_{*,a}, z_a; m_a; M_a, \eta) P(M_a, z_a|M, z) P(\eta)$$

a highly simplified model for the dynamical evolution of satellites:

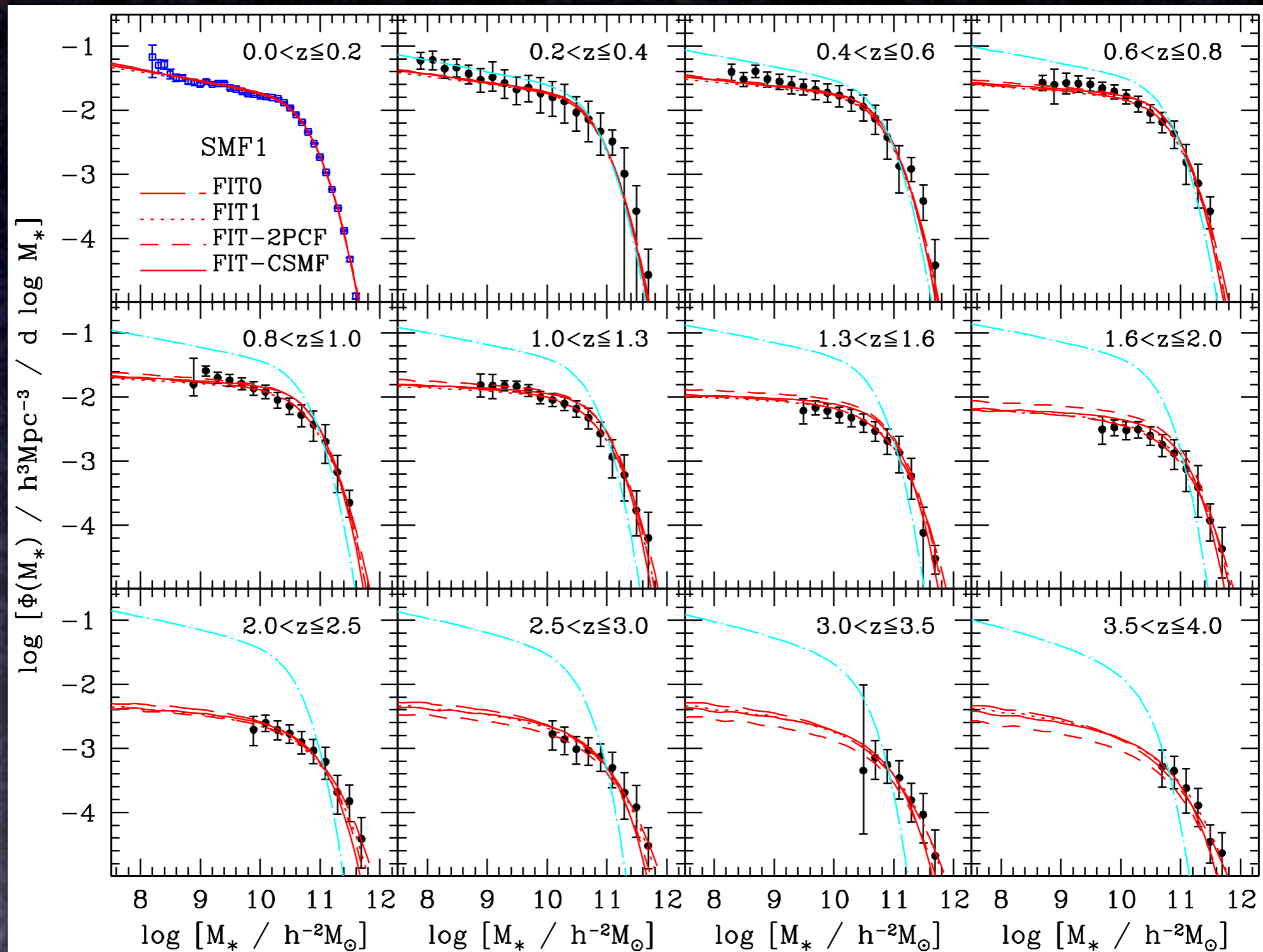
$$P(M_*, z|M_{*,a}, z_a; m_a; M_a, \eta) = \begin{cases} \delta^D(M_* - M_{*,a}) & \text{if } \Delta t < \alpha t_{\text{df}}(m, M, z, \eta) \\ 0 & \text{otherwise} \end{cases}$$

free parameter

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Fit to Stellar mass Functions

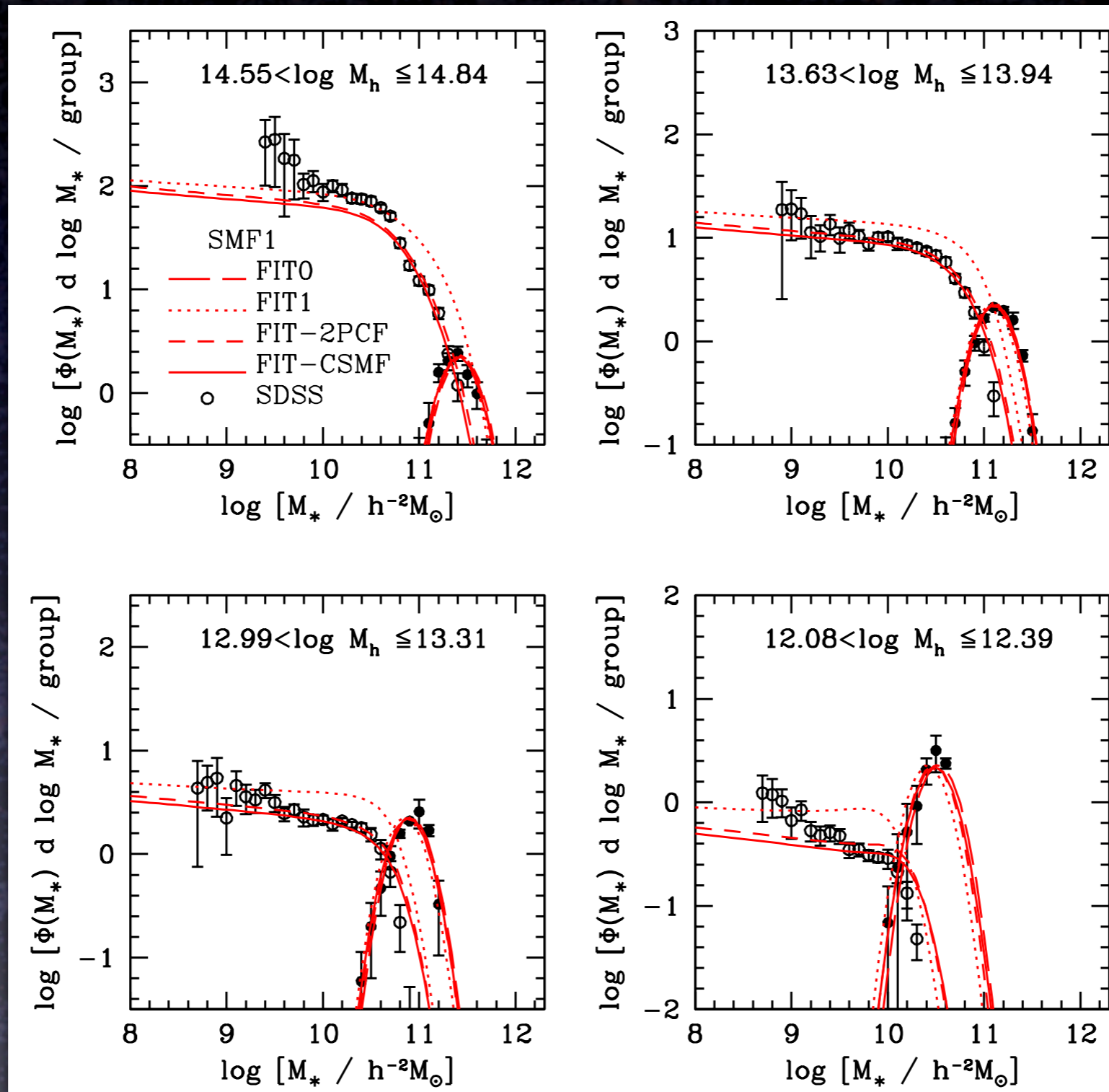


Data: from Yang et al (2009; $z \sim 0.1$) and from Perez-Gonzales et al. (2008)

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Fit to Conditional Stellar mass Functions at $z \sim 0.1$

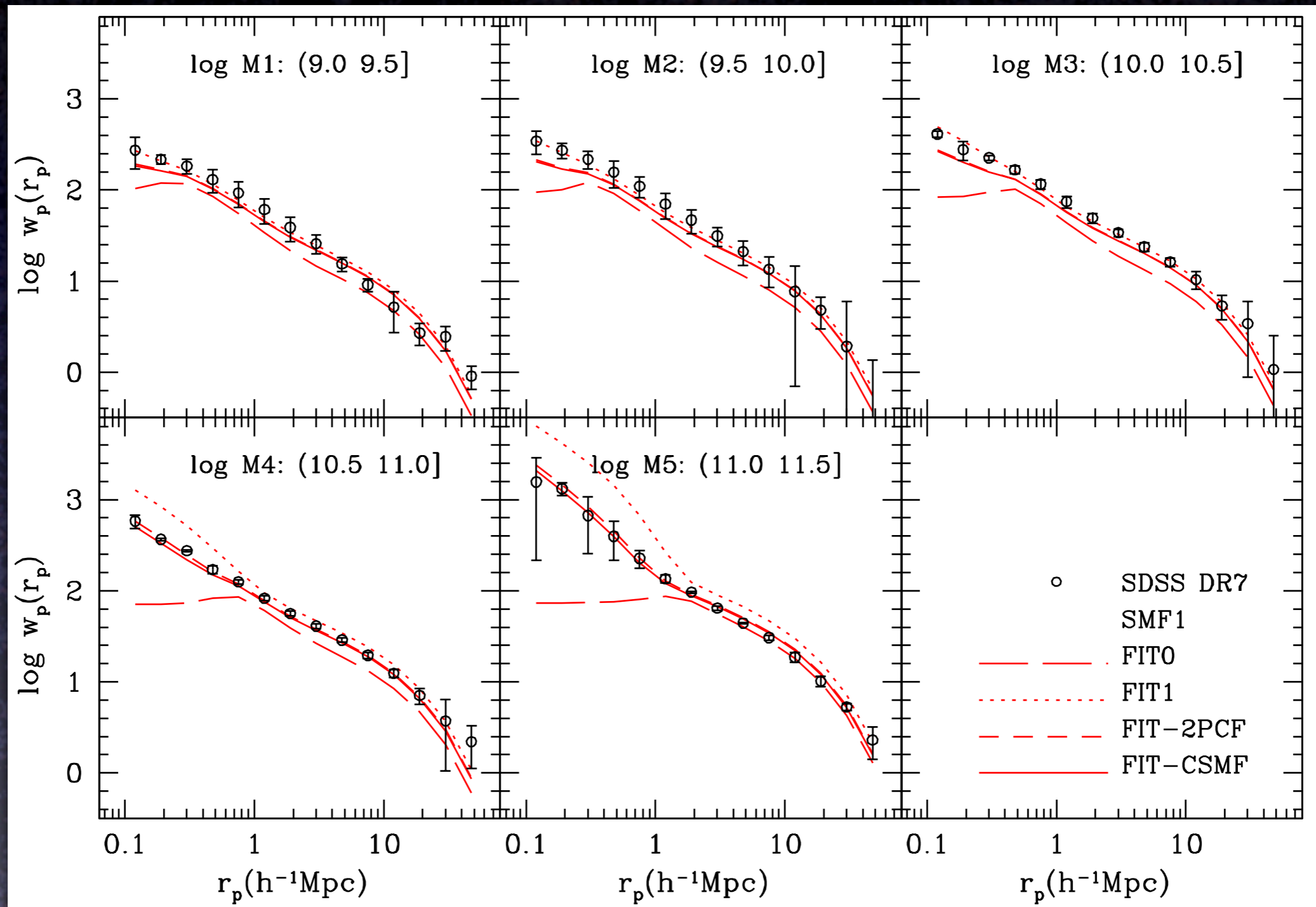


Data: from SDSS Galaxy Group Catalogues (Yang et al. 2009)

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Fit to two-point correlation functions at $z \sim 0.1$

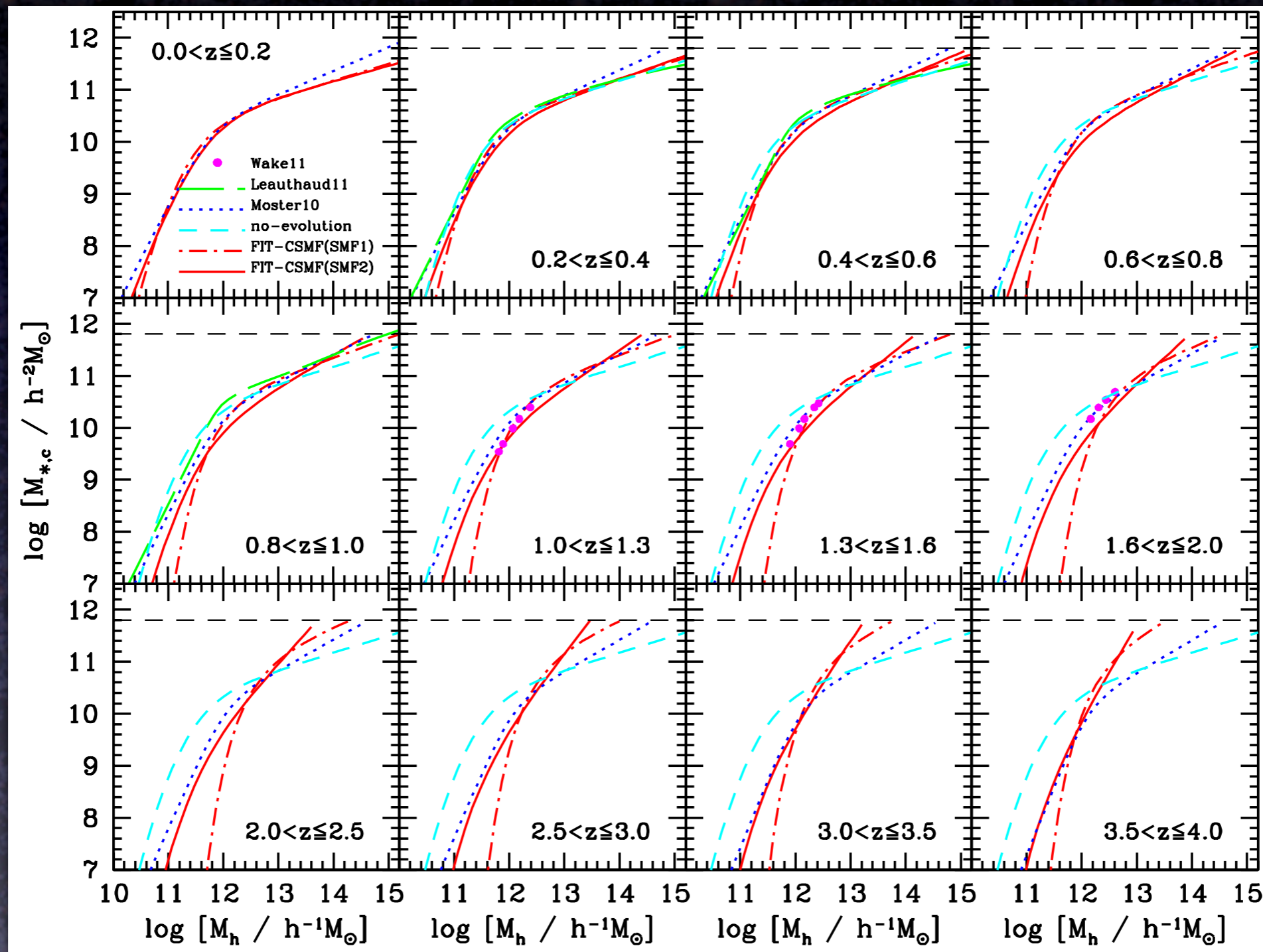


Data: our own analysis of SDSS DR7 (Yang et al. 2011)

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Comparison to previous studies:

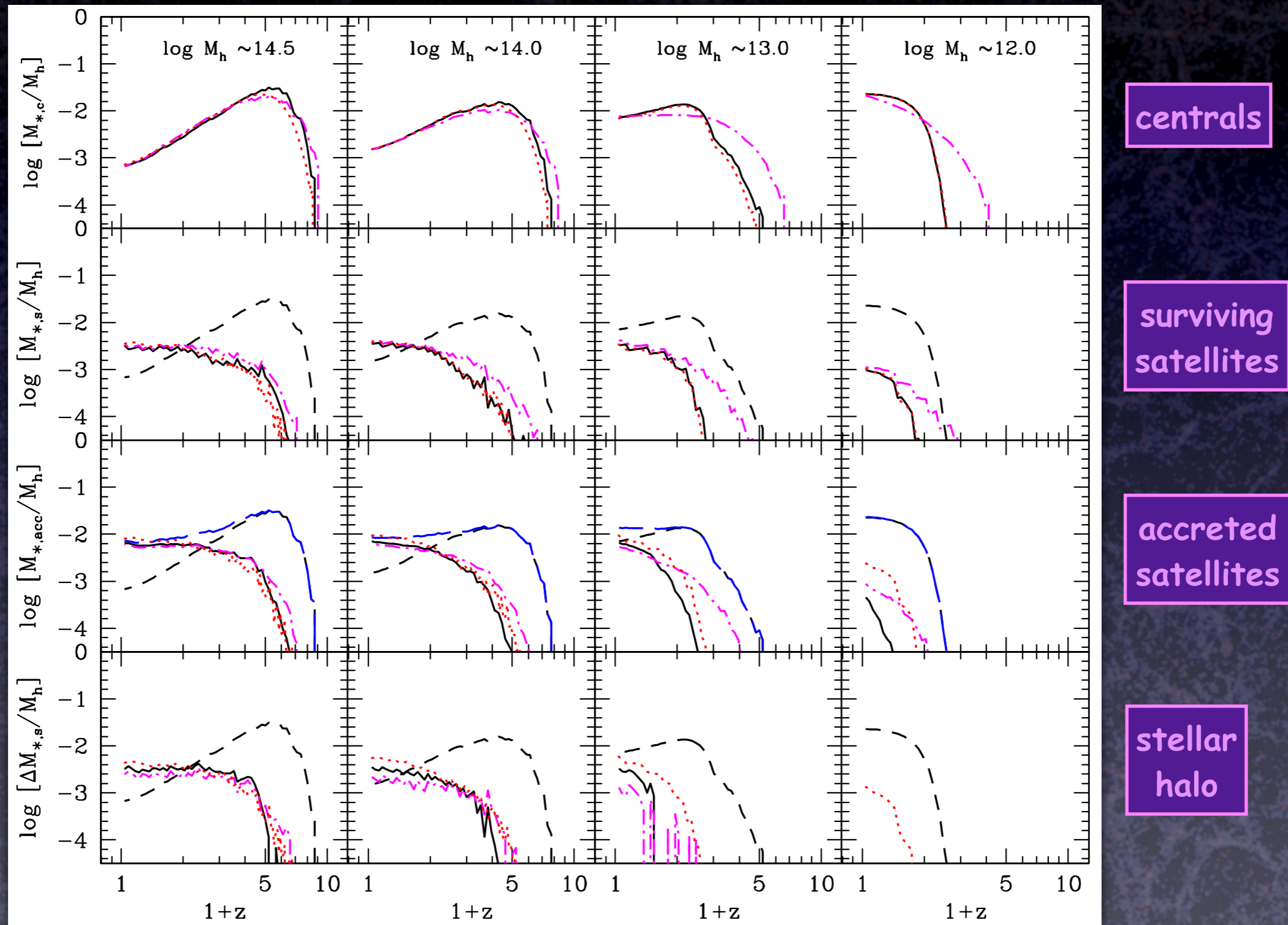


Overall reasonable agreement, but our self-consistent method predicts a bit more evolution than previous methods.

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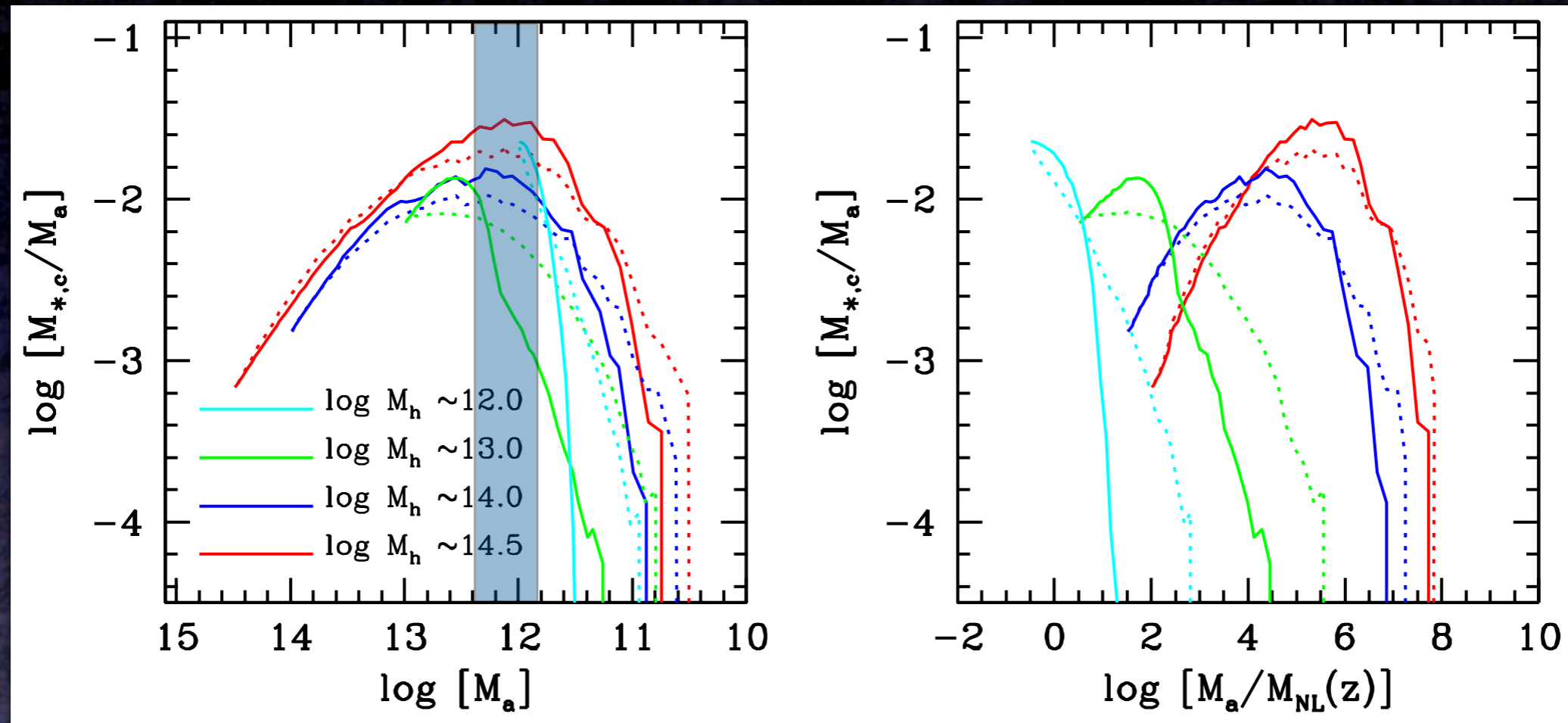
The inferred stellar assembly histories of galaxies



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The inferred stellar assembly histories of galaxies



Stellar Mass Growth is truncated once halo mass reaches $\sim 10^{12} h^{-1} M_\odot$