# The stellar masses and specific star-formation rates of submillimetre galaxies

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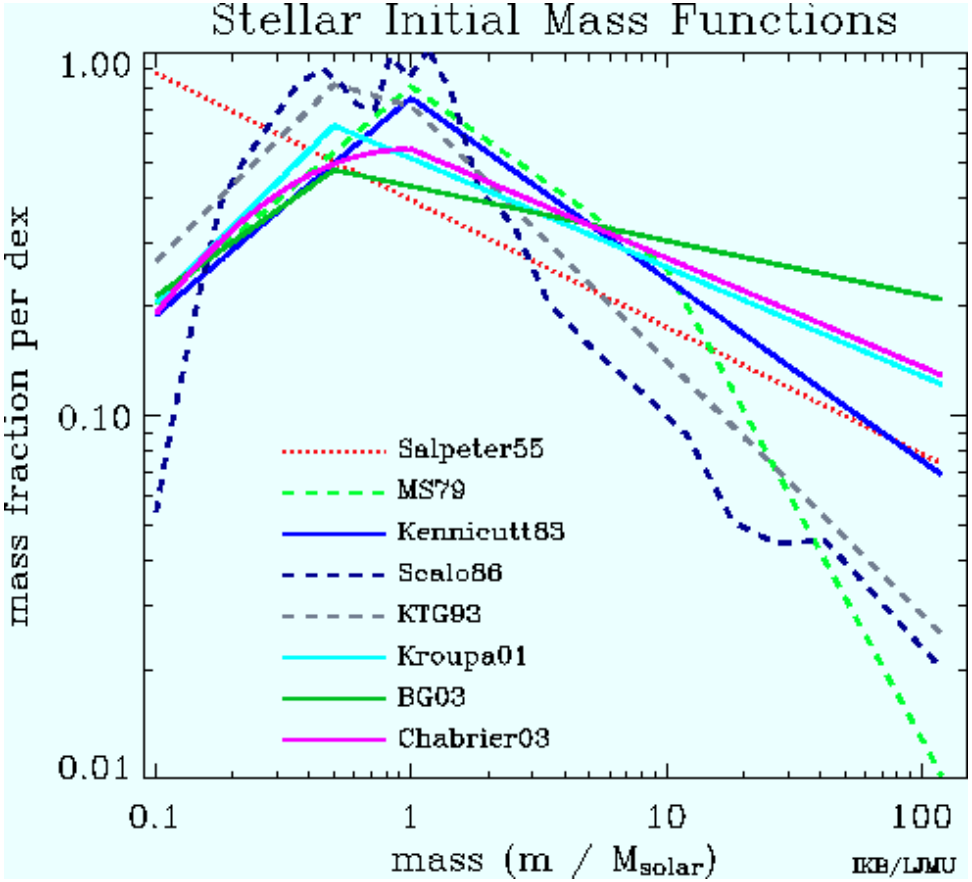
# Stellar masses of Submillimeter Galaxies (SMGs)

Two recent studies of *the same* sample of SMGs reached inconsistent conclusions:

- Michałowski et al. (2010, A&A, 514, A67): $\log M_* \simeq 11.5\ \mathrm{M}_\odot$
- Hainline et al. (2011, ApJ, 740, 96): $\log M_* \simeq 10.7\ \mathrm{M}_\odot$

# Stellar models and star formation histories

- Initial mass function: Chabrier
- Stellar synthesis models: Padova tracks, Bruzual & Charlot (2003), Maraston et al. (2005)
- Star formation history (SFH)




Baldry et al. (2003, ApJ, 593, 258)

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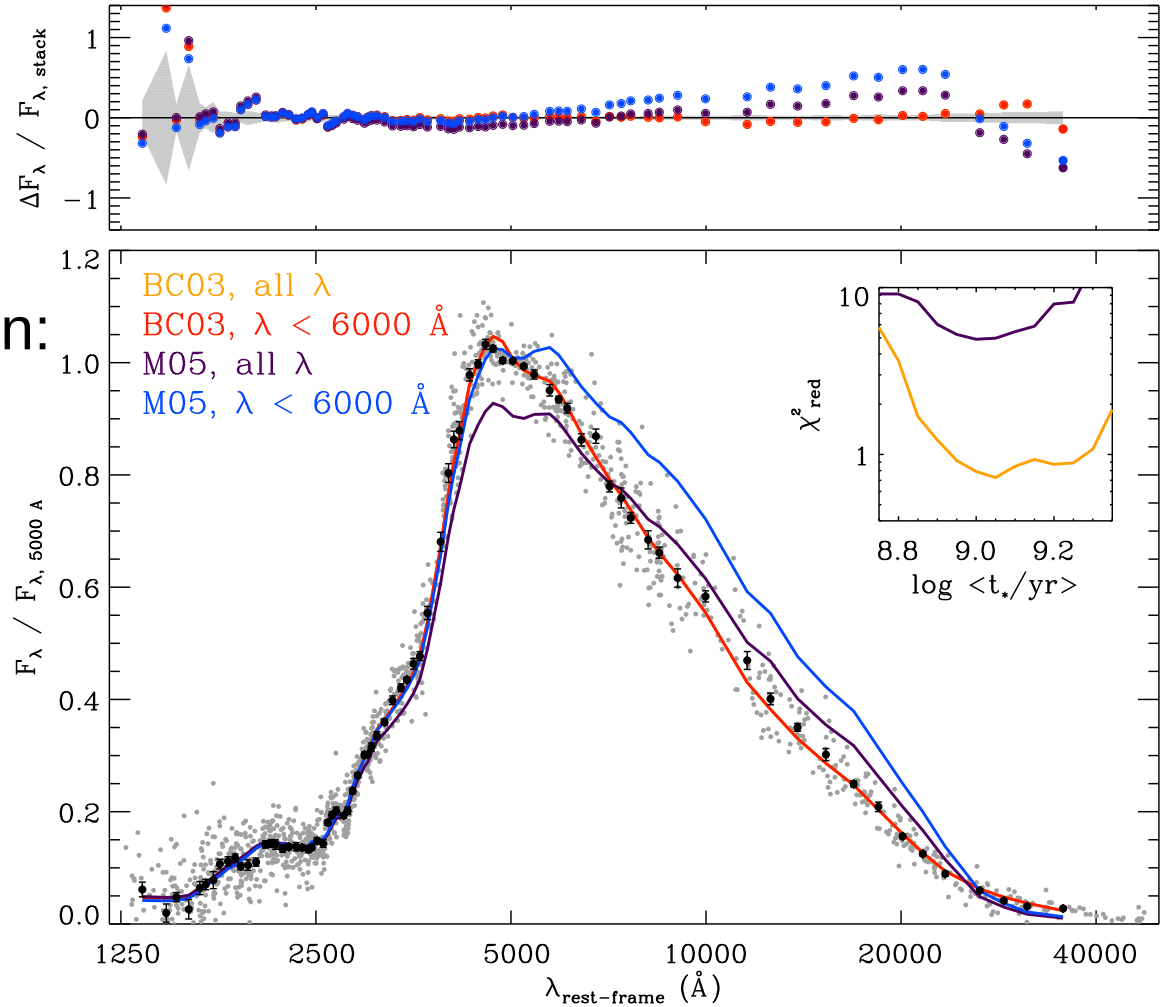


Kriek et al. (2010, ApJ, 722, L64), Zibetti et al., (arXiv:1203.4571)

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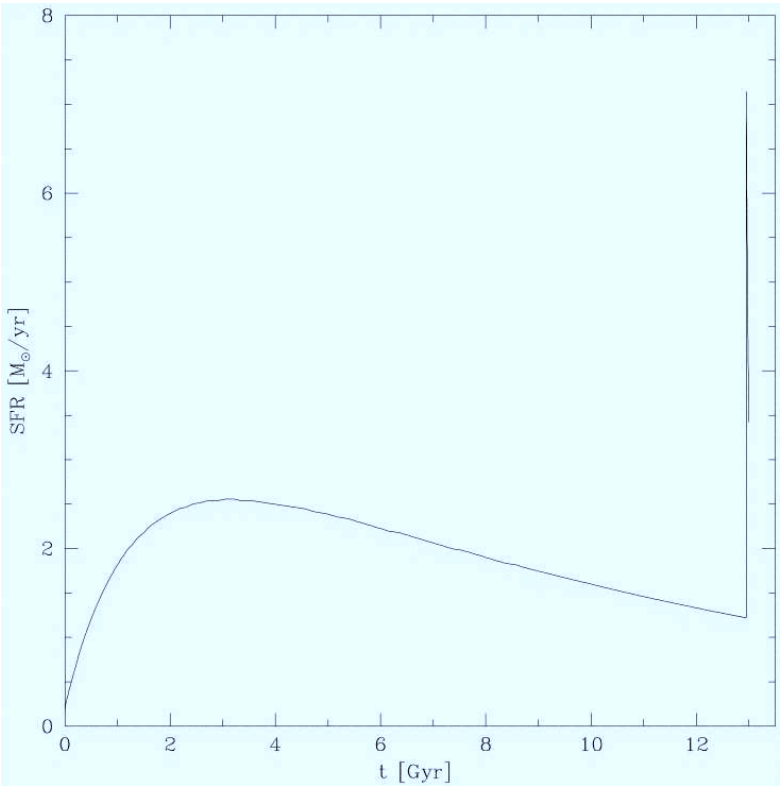
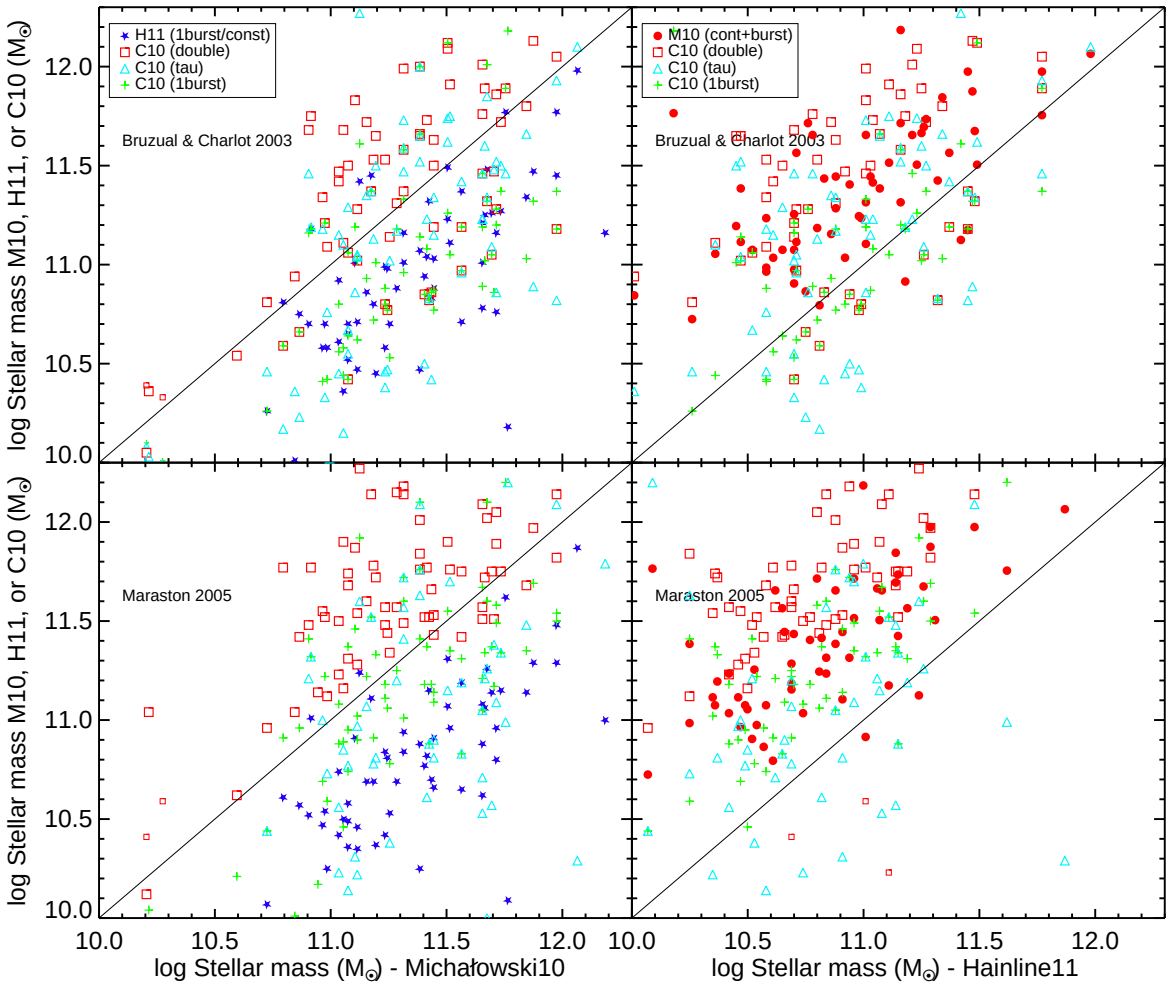



Silva et al. (1998, ApJ, 509, 103)

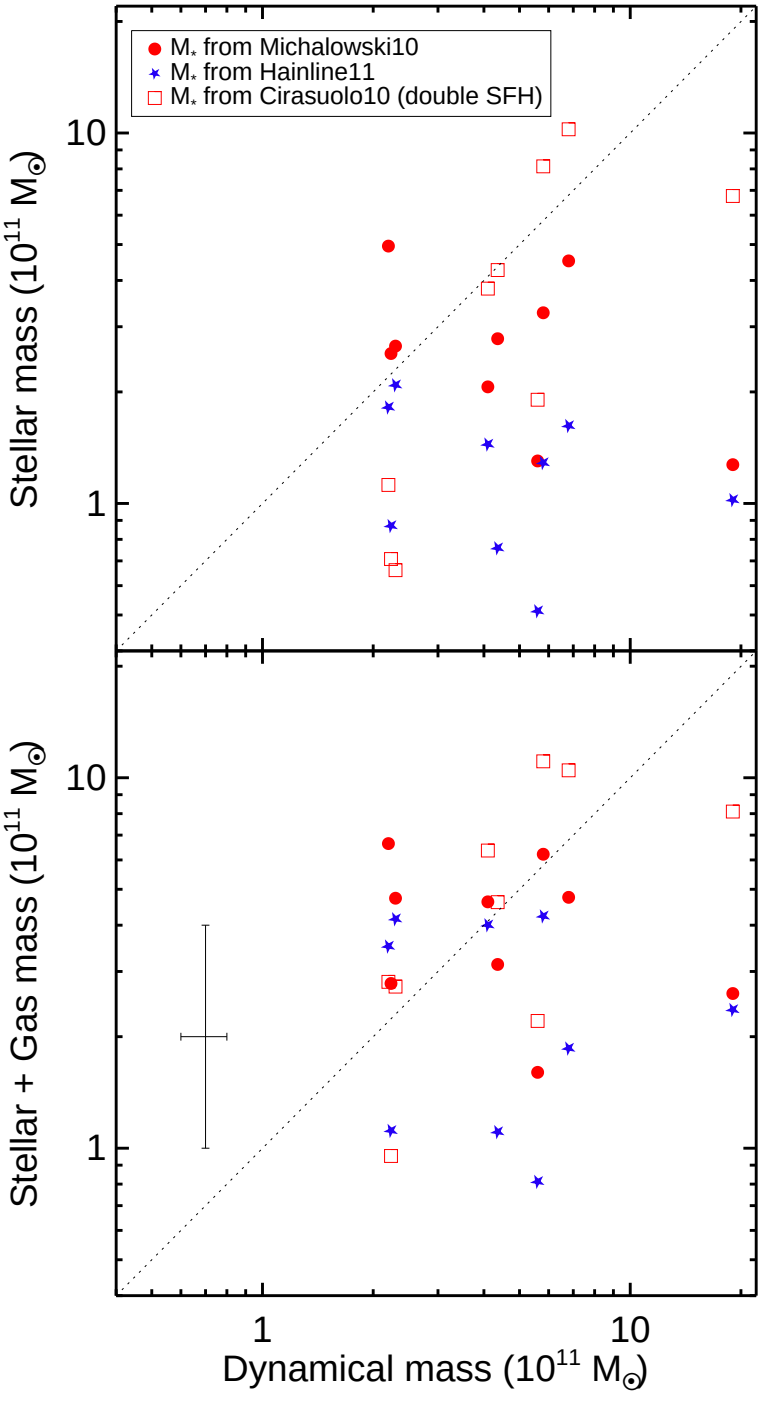
# Assumptions for this work

- Michałowski+10: Padova tracks, double SFH
- Hainline+11: Bruzual & Charlot (2003) / Maraston et al. (2005), constant / tau SFH
- Cirasuolo+10: Bruzual & Charlot (2003) / Maraston et al. (2005), single burst / double burst / tau SFH

# Stellar models and star formation histories

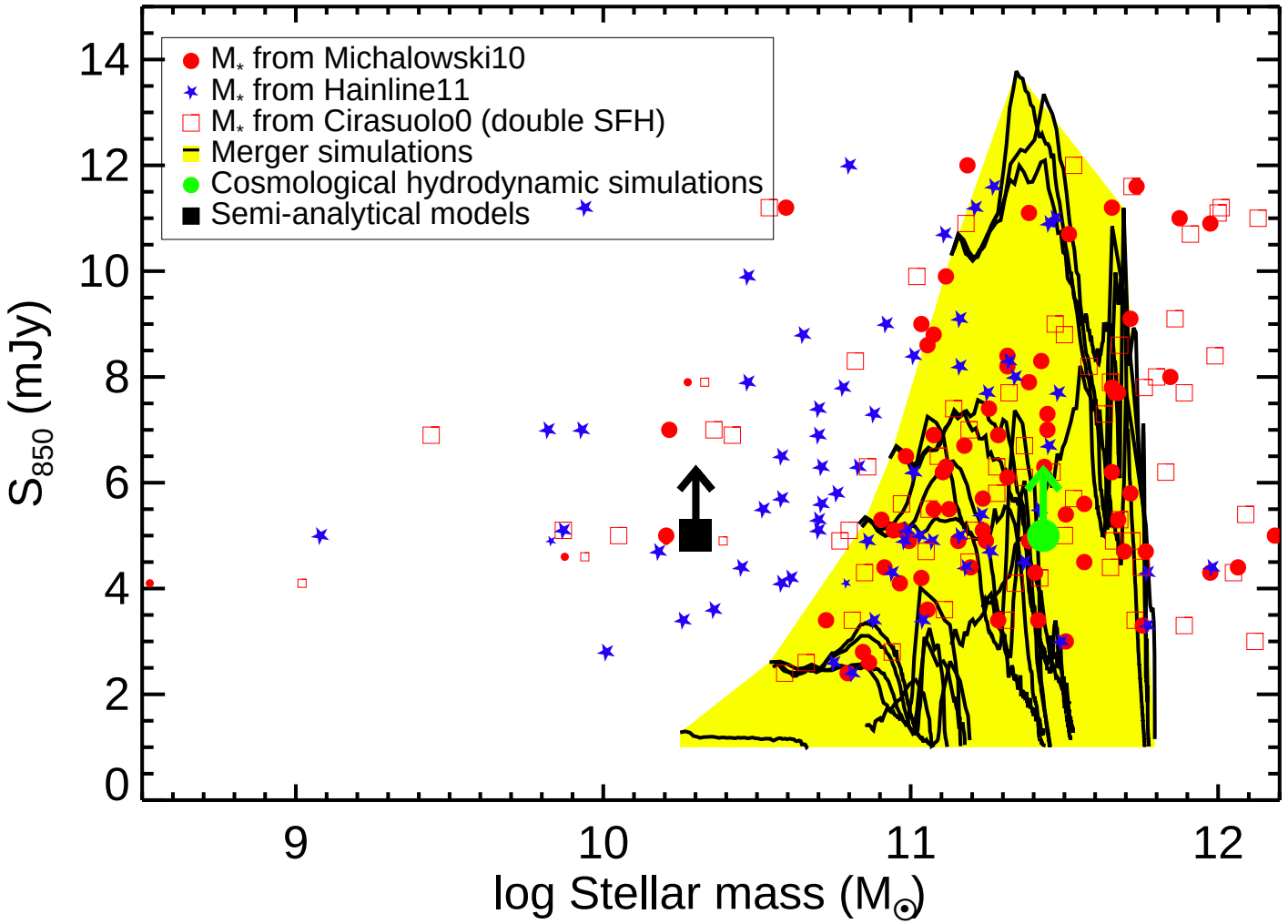



- Double SFHs: 11.3 – 11.5 $M_\odot$ (0.4–0.7 dex above single SFHs)
- BC03: 10.8 – 11.4 $M_\odot$
- Maraston: 10.5 – 11.5 $M_\odot$

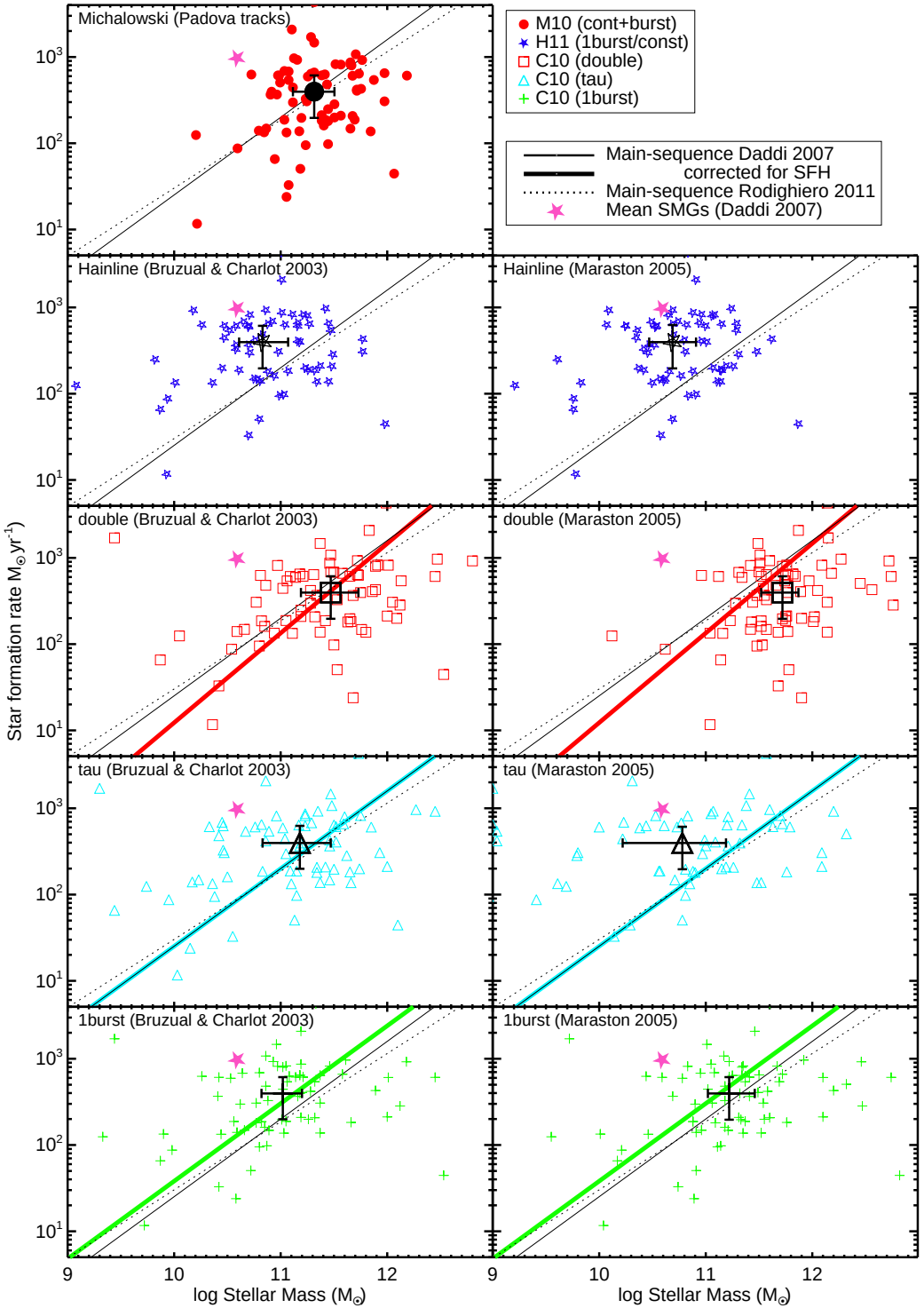



- High excitation CO lines may underestimate dynamical masses (probe only the central dense gas)
- Using CO(1-0):
  - median $(M_* + M_{\rm gas})/M_{\rm dyn} \simeq 1.07$ for Michałowski et al. (2010)
  - median $(M_* + M_{\rm gas})/M_{\rm dyn} \simeq 0.72$ for Hainline et al. (2011)

# Theoretical models




- Consistent: double SFHs, cosmological and merger sims
- Single SFHs: too low $M_*$
- SAMs: even lower $M_*$




- Double SFHs: SMGs are the most massive 'main-sequence' galaxies
- Single SFHs: SMGs are $\times < 2$ away from M-S

# Conclusions

- Reported difference of $M_*$ of SMGs can be fully explained by different SSP and SFH assumptions
- SMGs form the high-mass end of the ‘main-sequence’ of star-forming galaxies
- More details in Michałowski et al. (2012, A&A, accepted, `arXiv:1108.6058`)