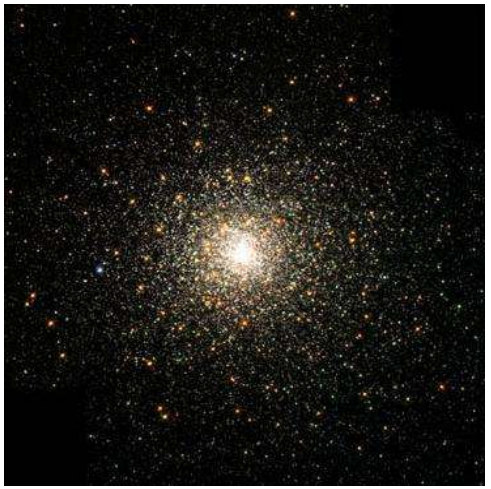
Physical upper limit to the masses of clusters



Mark Gieles (Utrecht)

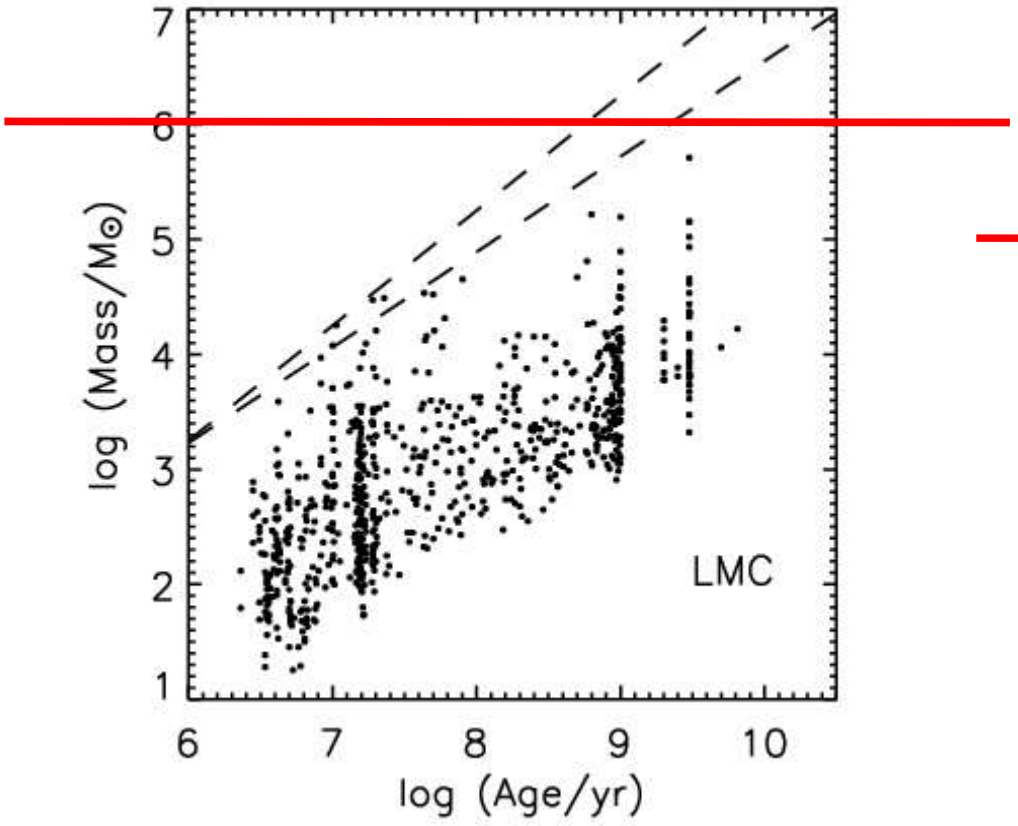
+

Søren Larsen (ESO/Garching)

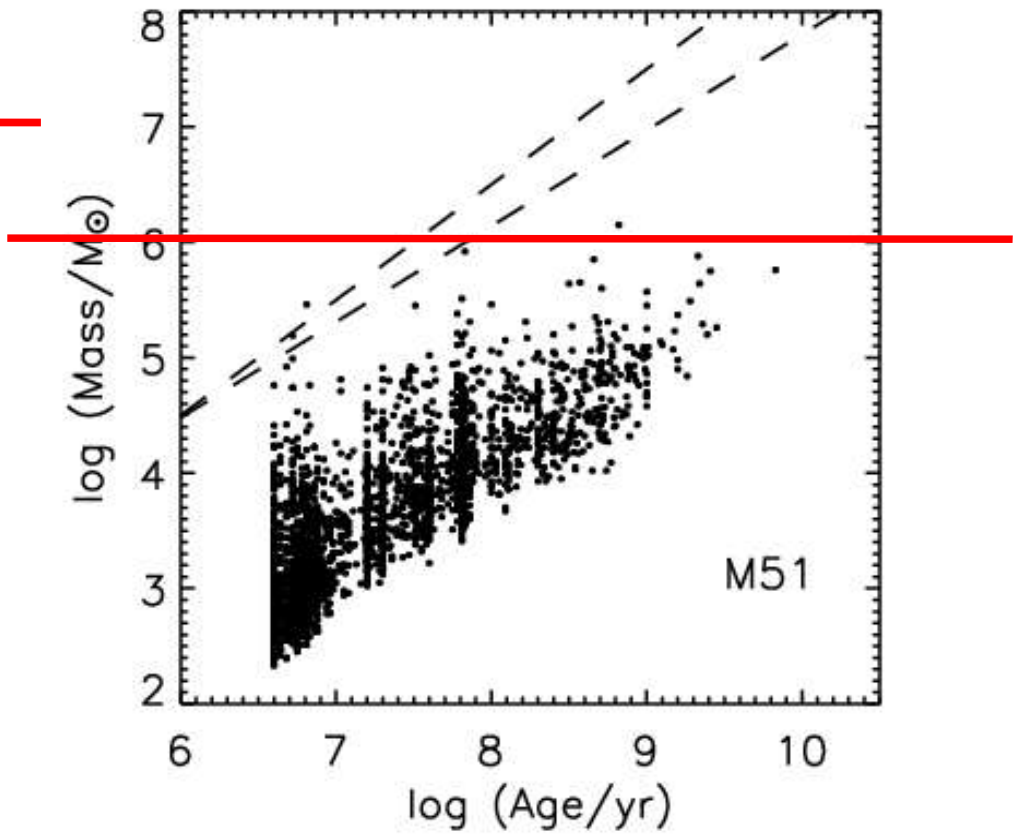
Henny Lamers / Remco Scheepmaker / Marcel Haas (Utrecht)

Nate Bastian (UCL)

Maximum mass *vs.* log(age)



Hunter et al. 2003, AJ, 126, 1836

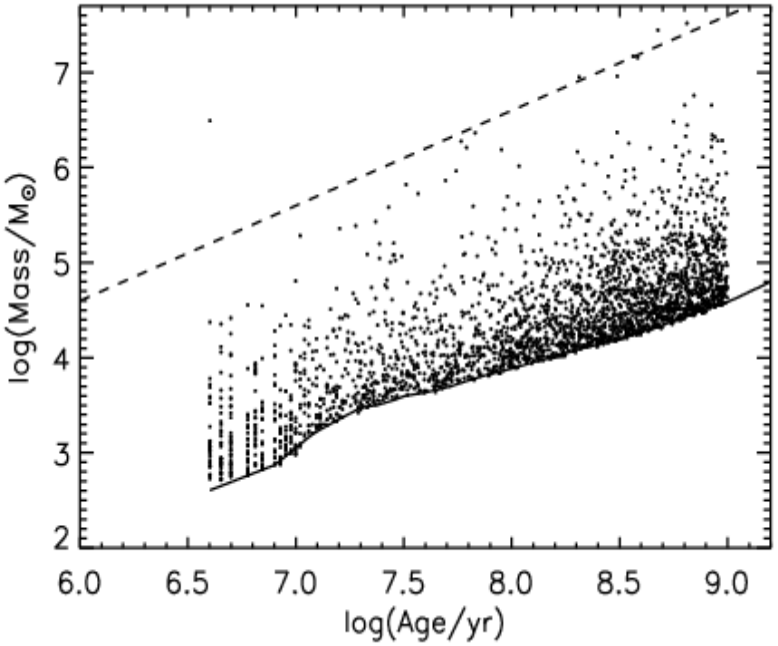


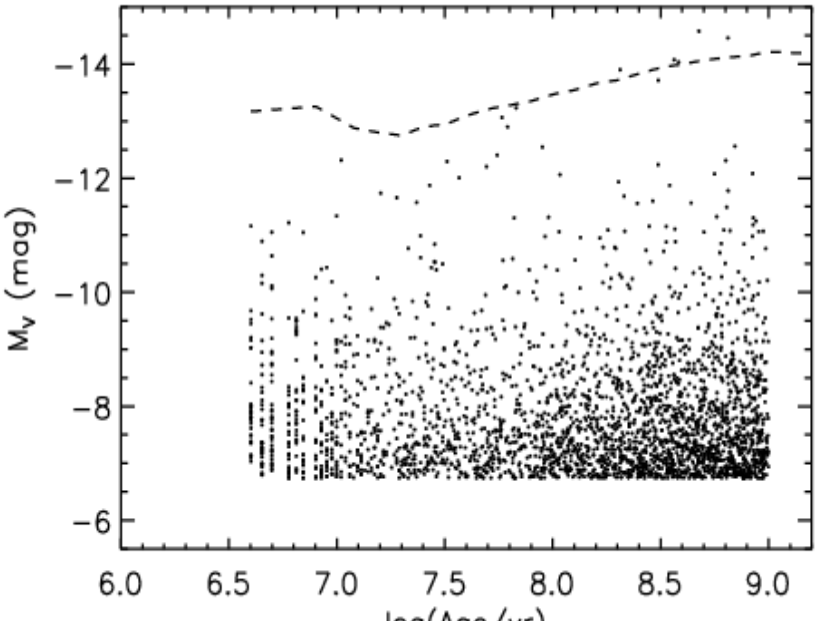
Gieles, Larsen, Bastian & Stein 2005, submitted to A&A

Mass

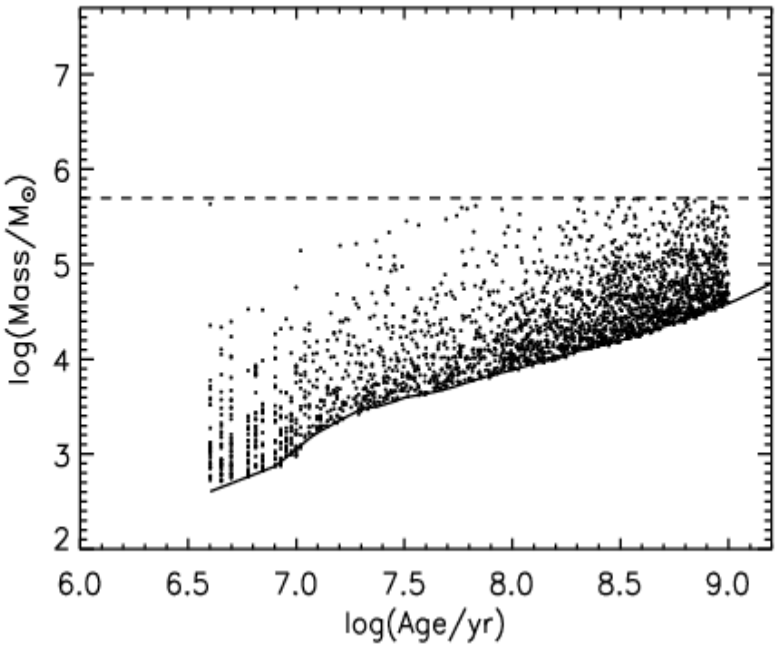
Luminosity

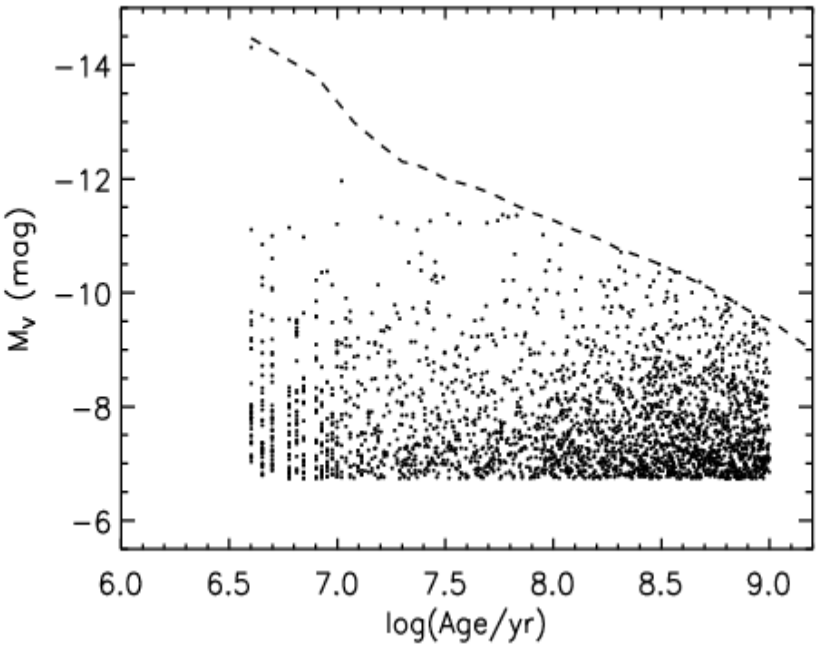
Untruncated





Truncated at 5×10^5 $M_\odot$

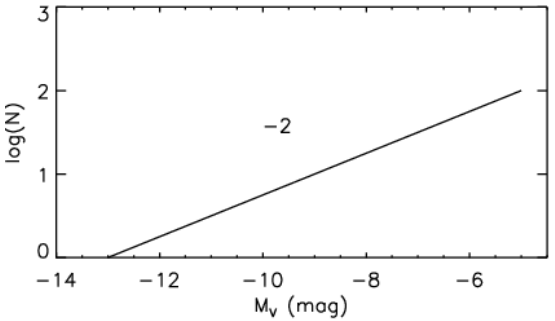


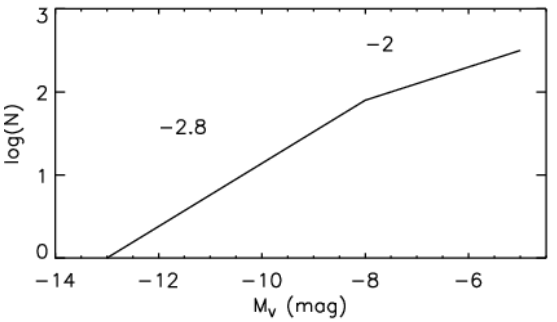


Untruncated

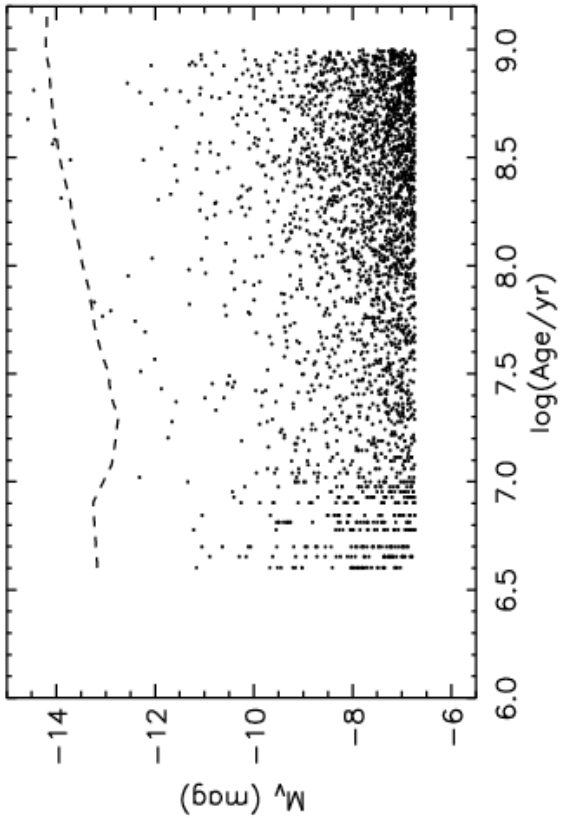
Truncated at $5 \times 10^5 M_\odot$

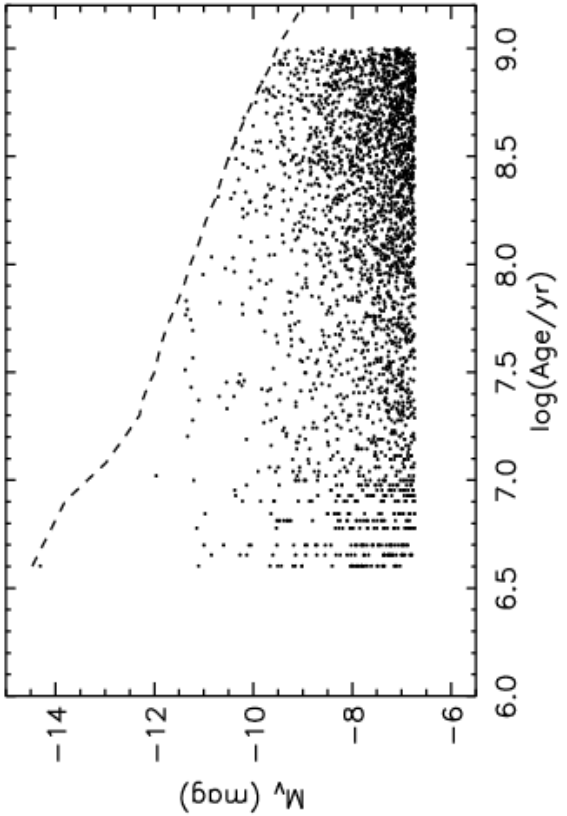
Resulting LF:
(easy to observe)

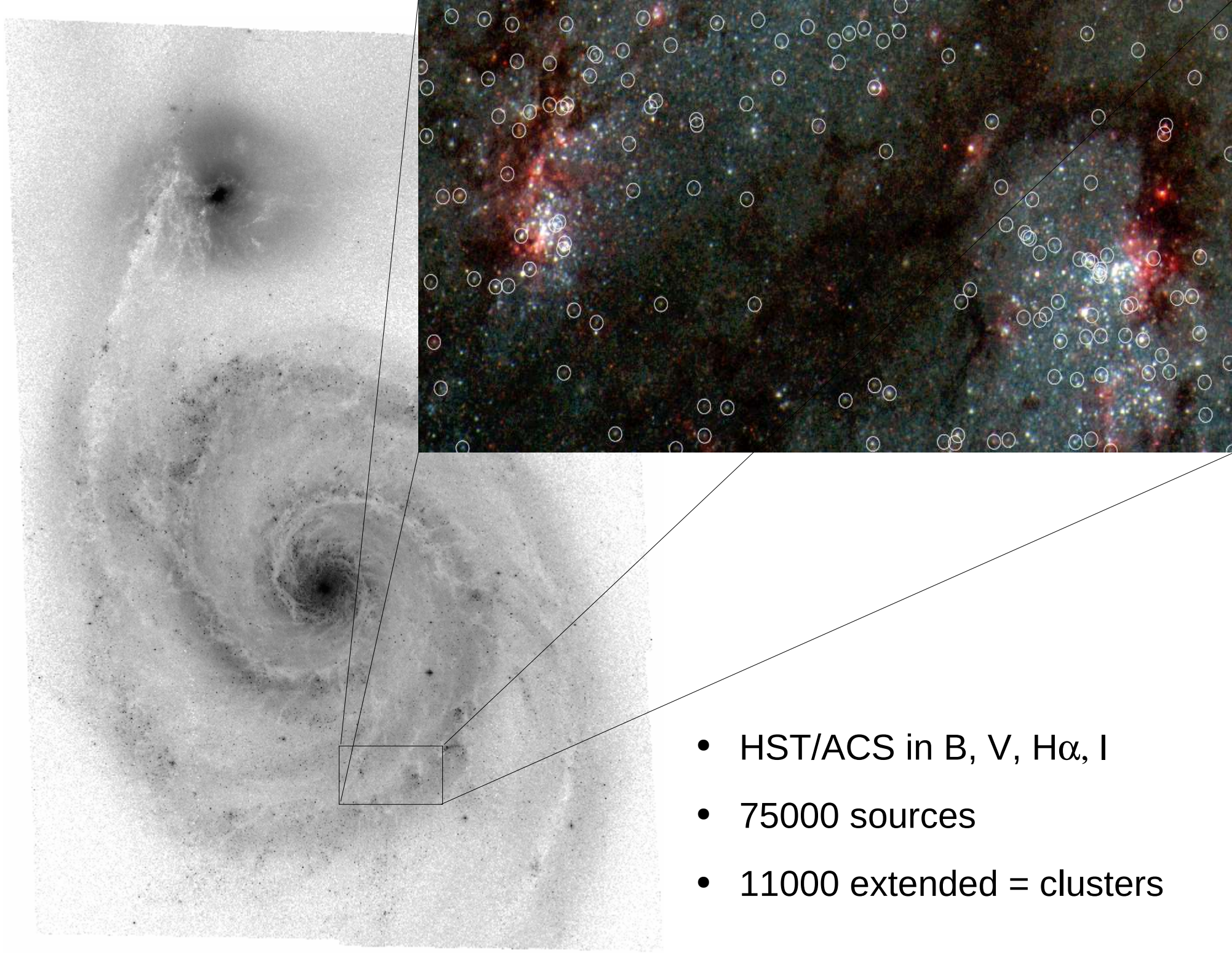




Underlying masses:
(hard to observe)





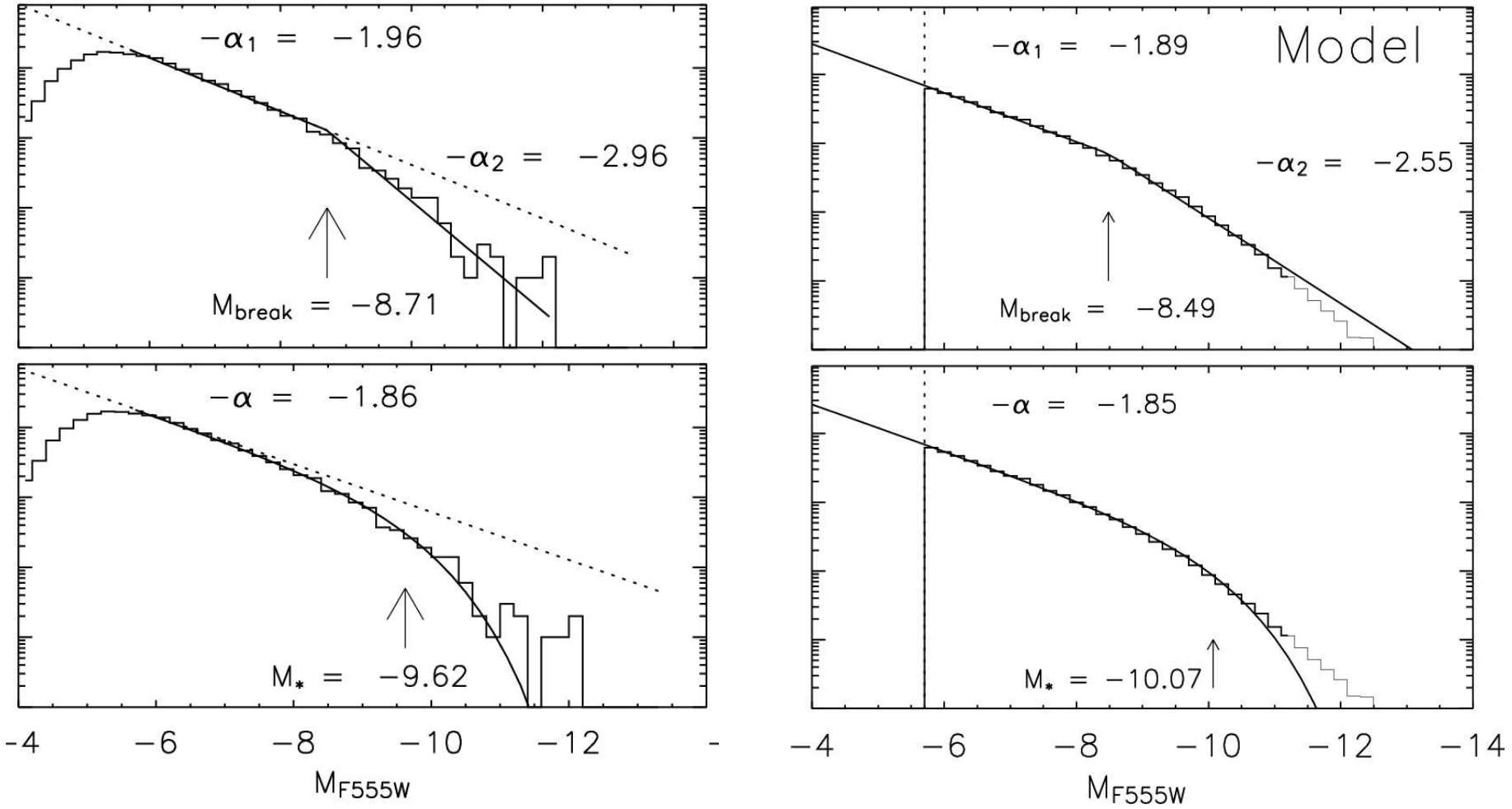


- HST/ACS in B, V, Hα, I
- 75000 sources
- 11000 extended = clusters

The cluster luminosity function of M51

Observed

Model with truncation at 5×10^5 $M_\odot$



Gieles, Larsen, Scheepmaker, Bastian, Haas & Lamers 2005,
to be submitted to A&A letters

Conclusions

- The cluster mass function (MF) seems truncated at:
  - 5×10^5 $M_\odot$ in M51;
  - 2×10^6 $M_\odot$ in the ``Antennae'' galaxies
- Truncation of the MF visible as *bend* in the LF
- Truncation only *detectable* in galaxies with sufficiently high star/cluster formation rate