# The Dynamical state of the GC M10

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Based on results in Beccari, G., Pasquato, M., De Marchi, G., Dalessandro, E., Trenti, M., & Gill, M. 2010, ApJ, 713, 194 ,


To Constrain Globular Cluster dynamics using mass segregation

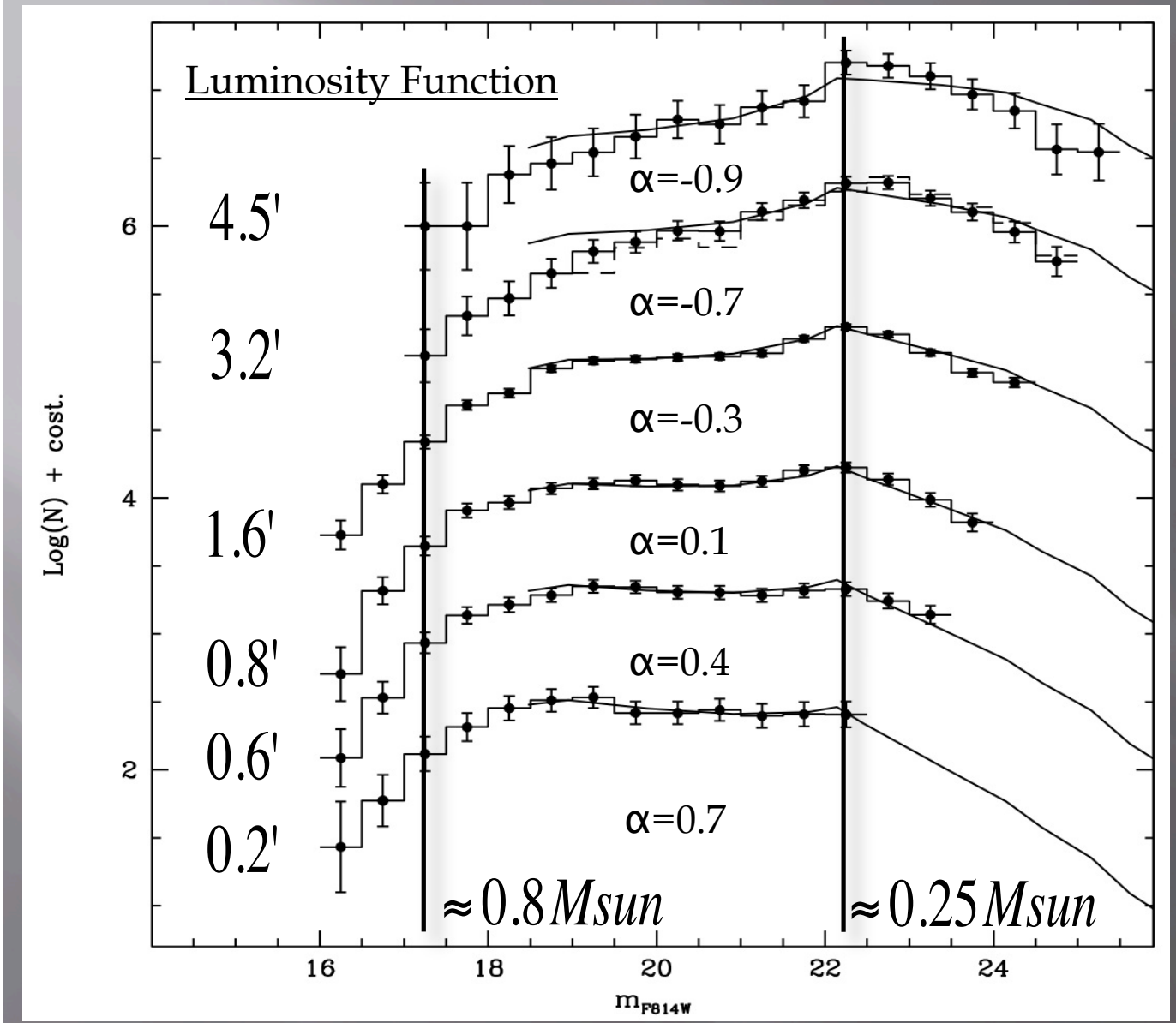
WHAT - Mass segregations is a collisional effect: Massive stars (and remnants) move to the core, least massive stars move out

WHY - Mass segregations is a good observational feature (compared to e.g. evaporation of stars, core collapse etc.)

High res. Imaging (HST) + Wide Field on 8-10m telescopes (LBC@LBT) sample 0.8-0.2 Msun

Central Massive Objects, ESO Garching, 22-25 June 2010

# Mass Segregation in M10: binary stars or IMBH?




M10
rc=0.84′
rh=2′
log(th)=8.7
Age~12Gyr

Luminosity Function (LF)

⬇

Mass Function (MF)
M-L from Baraffe et al 1997

$$dM/dm \propto m^{\alpha}$$

- Salpeter α=-2.35
- α>0 – N decreasing with mass

M10 is segregated

- Muti-mass Michie-King model

M10 is in a condition of equipartition of energy

*Beccari et al. 2010, ApJ, 713, 194*

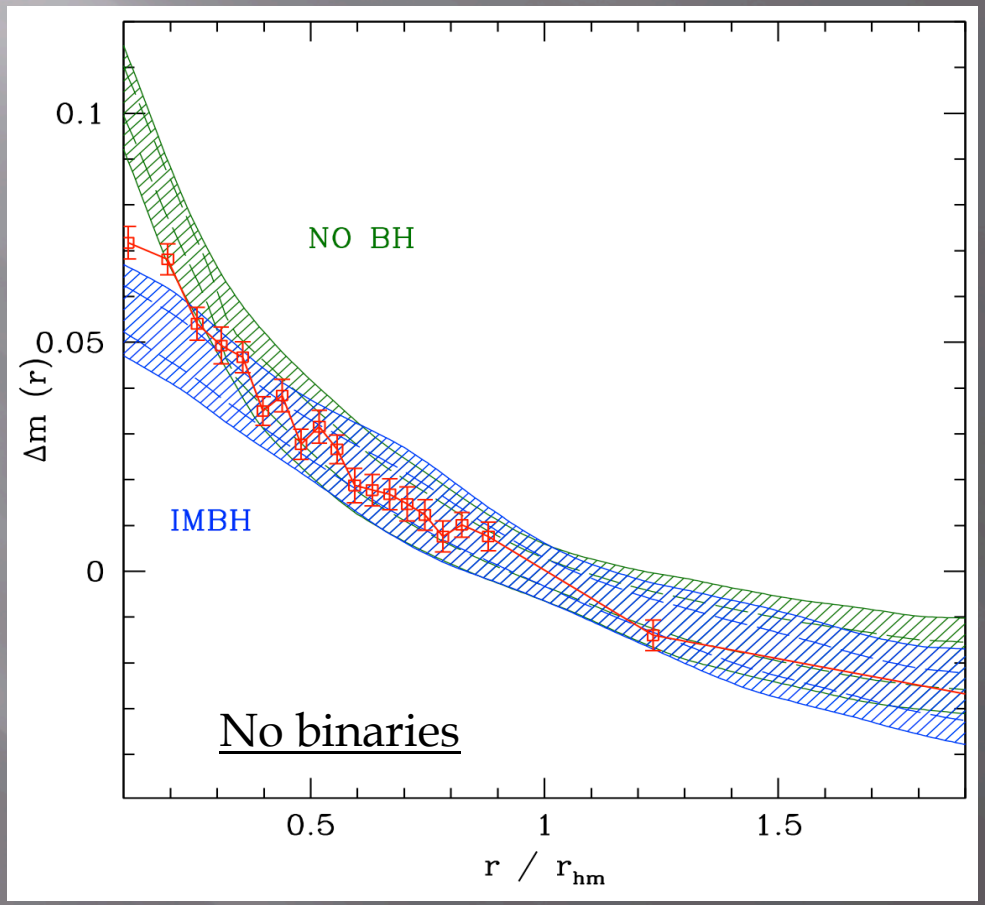
## Observations

Observed radial mass segregation profile ($\Delta m(r)=\langle m\rangle_{MS}(r)$ in $M_{sun}$)

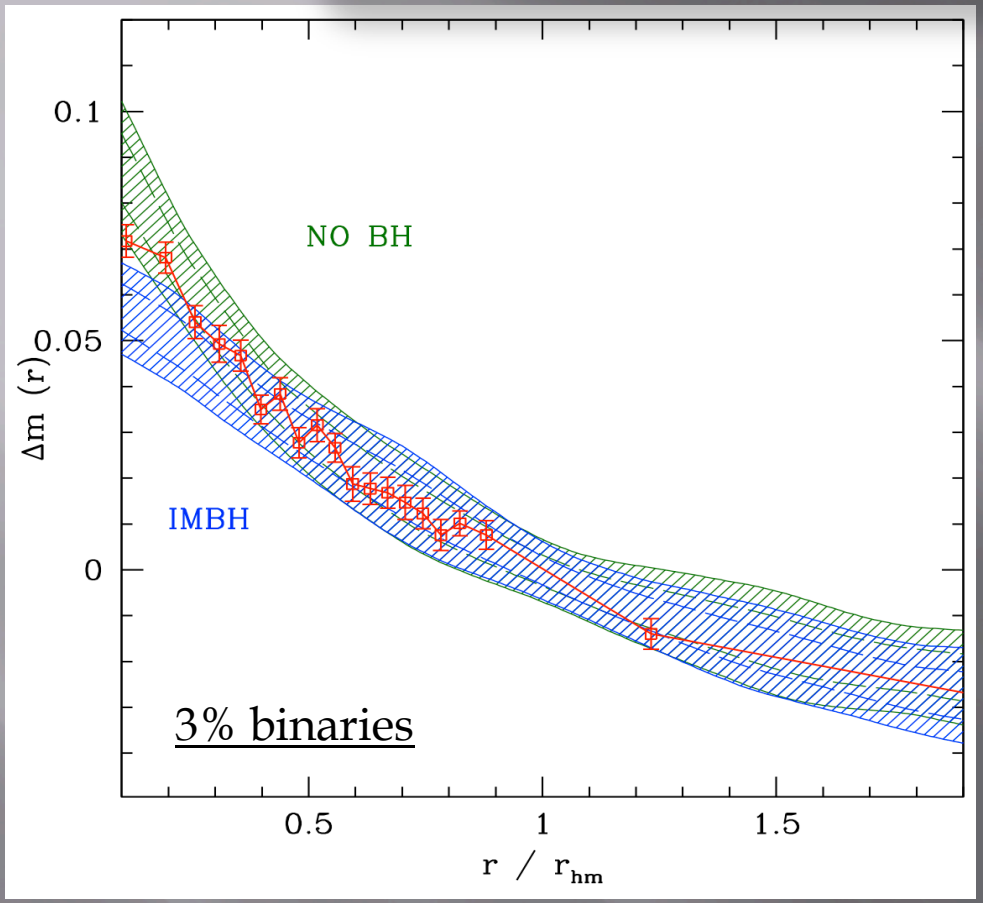
## N-BODY simulations

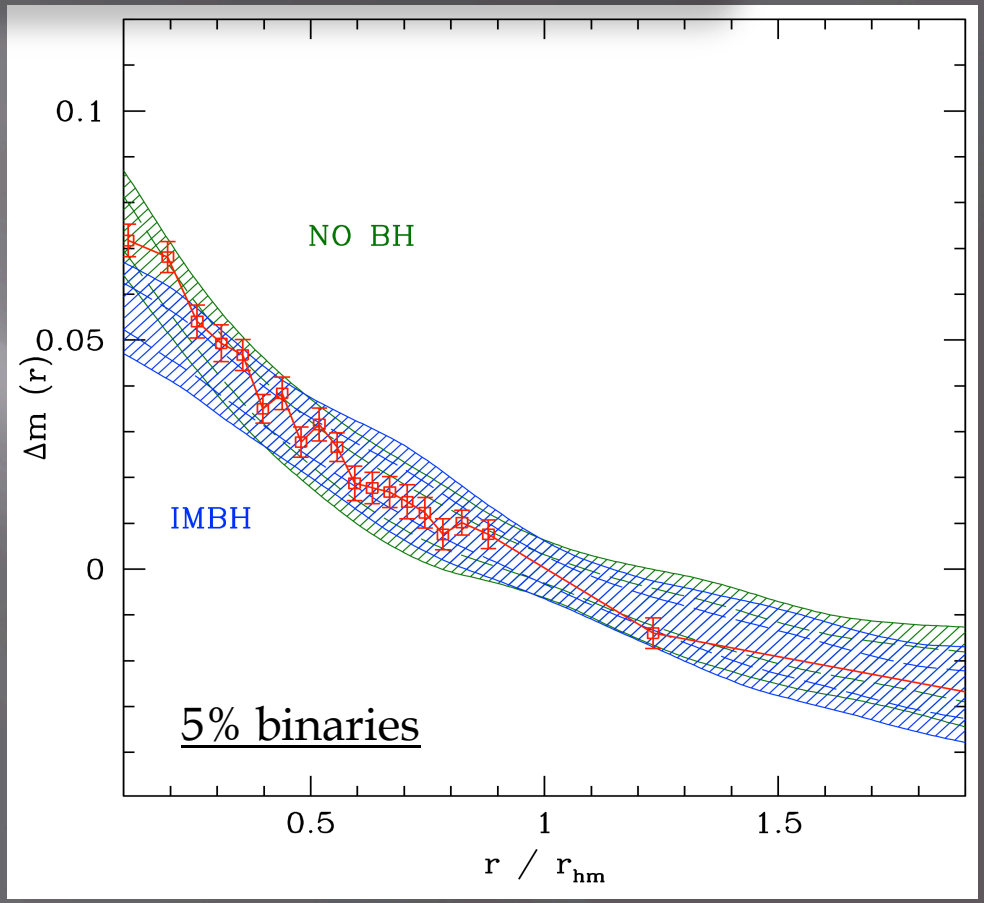
With IMBH of ~1% of GC mass

Without IMBH of GC mass



A *source of energy* is actively quenching mass segregation in the cluster:
Binaries (~3-5%)



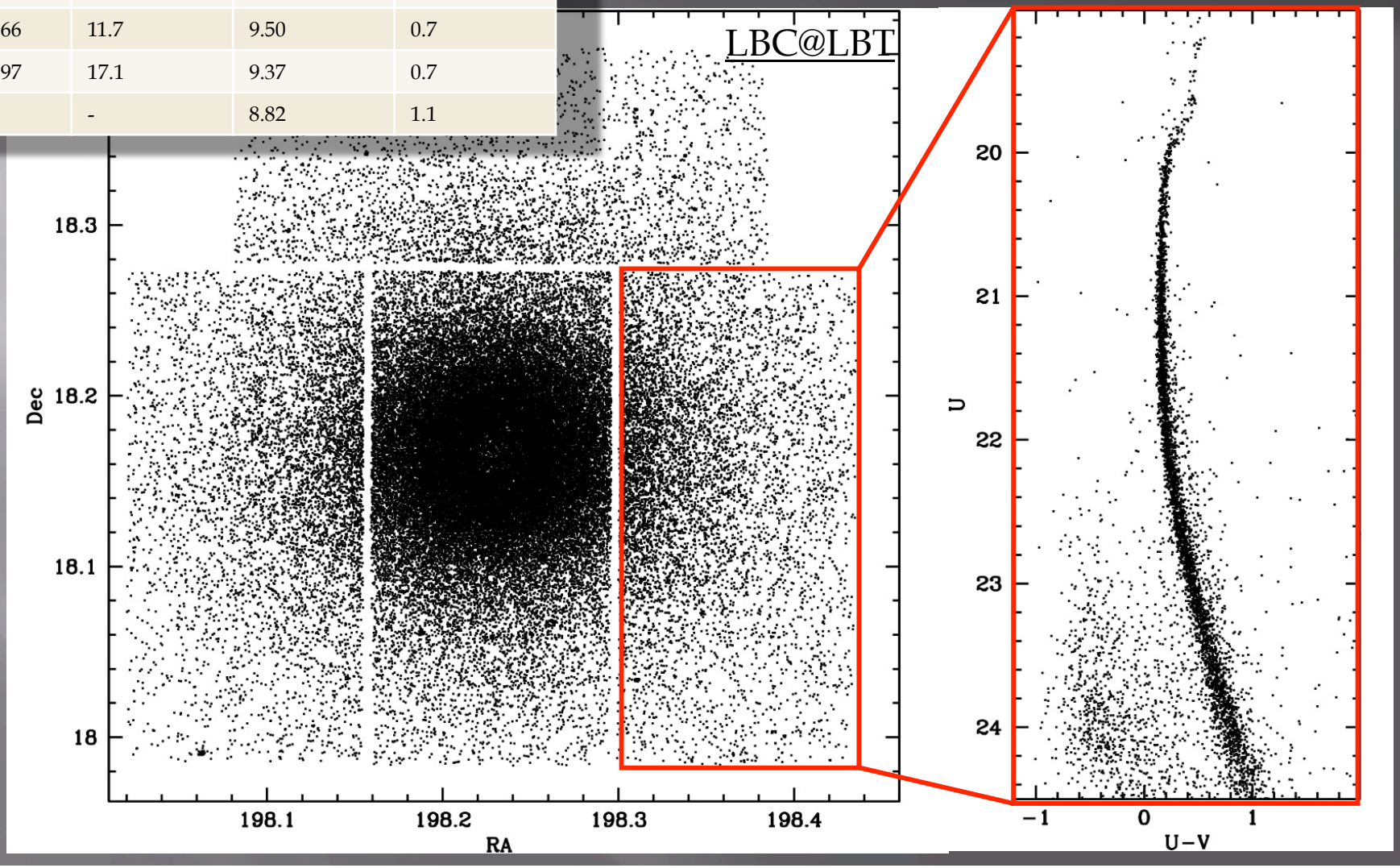




Dynamical measurement of the binary fraction

# Future...

| Name | Bin.fr. | log(th) | log(rt/rh) |
|---|---|---|---|
| NGC 288 | 14.5 | 9.13 | 0.8 |
| NGC 5053 | 12.5 | 9.62 | 0.6 |
| NGC 5466 | 11.7 | 9.50 | 0.7 |
| NGC 5897 | 17.1 | 9.37 | 0.7 |
| M92 | - | 8.82 | 1.1 |

Explore a sample of GC covering wide range in dynamical age and binary fraction!



…thank you!