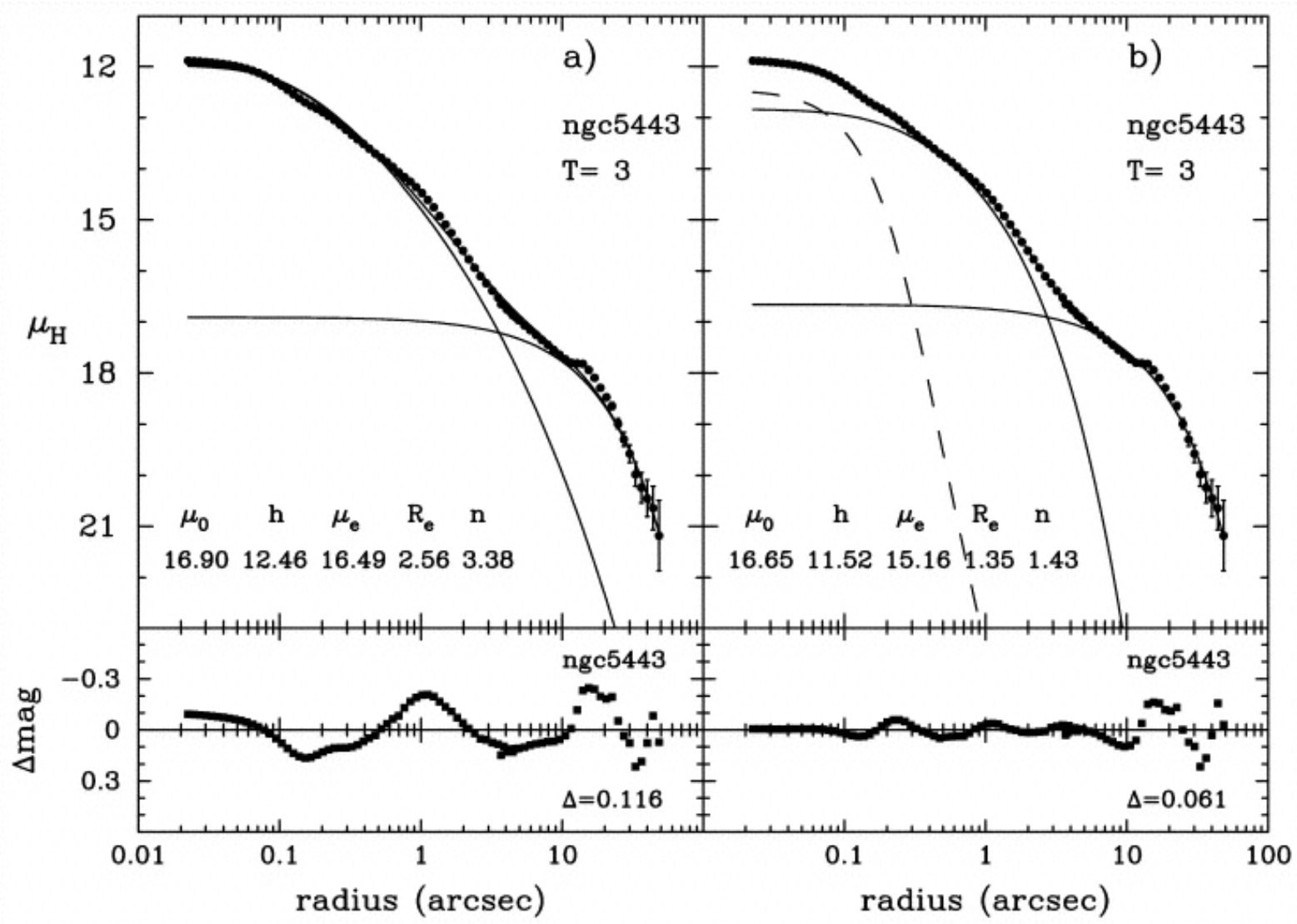
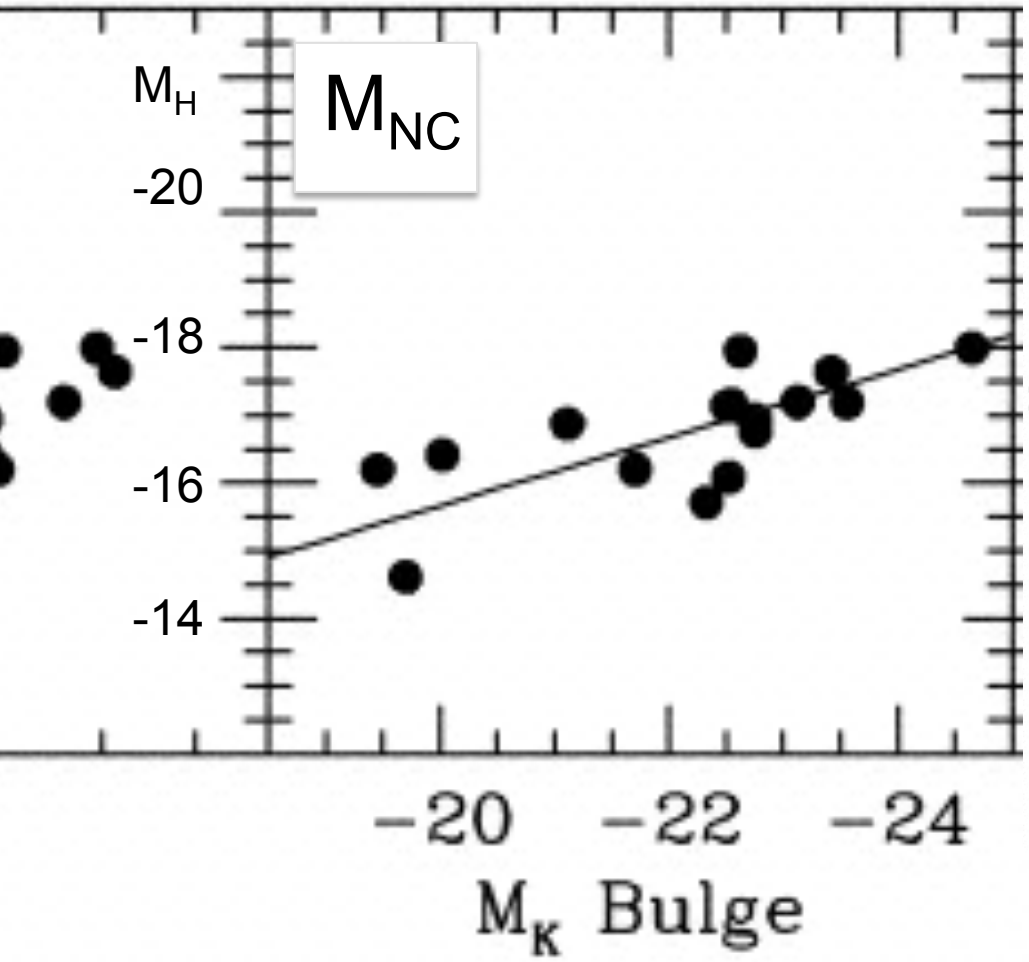
An HST galaxy light profile with nuclear star cluster
(Balcells et al. 2003, ApJ, 582, L79)

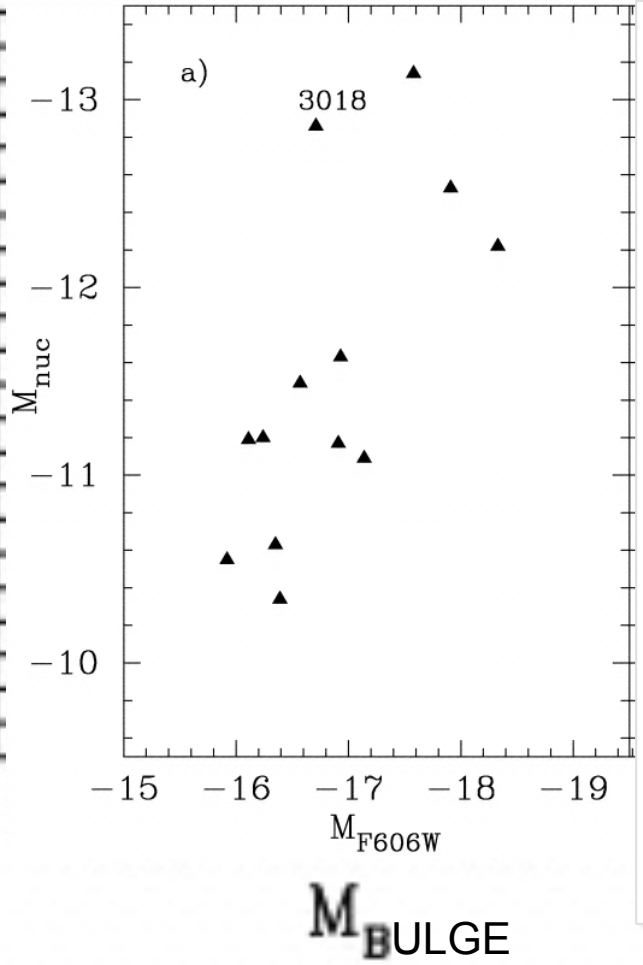


Nuclear cluster vs host bulge magnitude

Balcells et al. (2003, ApJ, 582, L79)



Graham & Guzman (2003, AJ, 125, 2936)



87% of dE sample nucleated

$L_{NC} \sim L_{bulge}^{0.87\pm0.26}$

Scaling Relations

Graham & Guzman (2003): $L_{NC} \sim L_{bulge}^{0.87\pm0.26}$

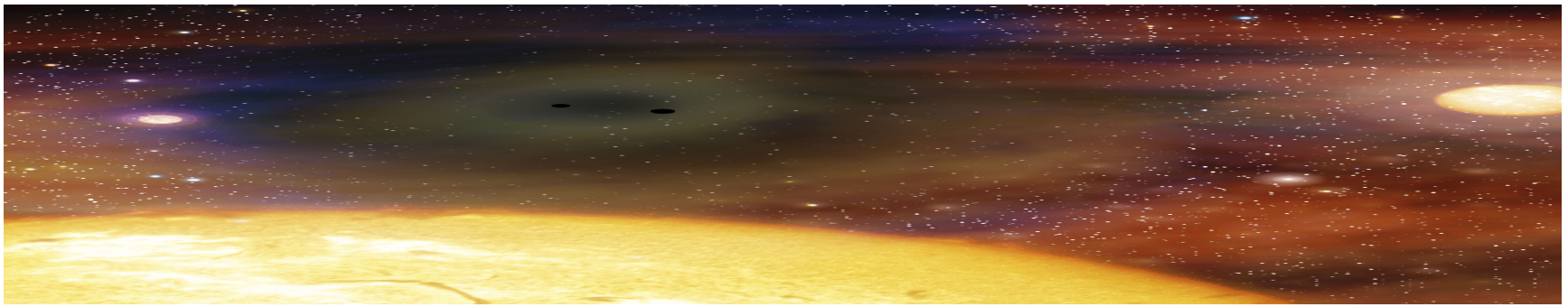
Balcells et al. (2007, ApJ, 665, 1084): $L_{NC} \sim L_{bulge}^{0.76\pm0.13}$

Grant et al. (2005, MNRAS, 363, 1019): $L_{NC} \sim L_{bulge}^{0.7}$

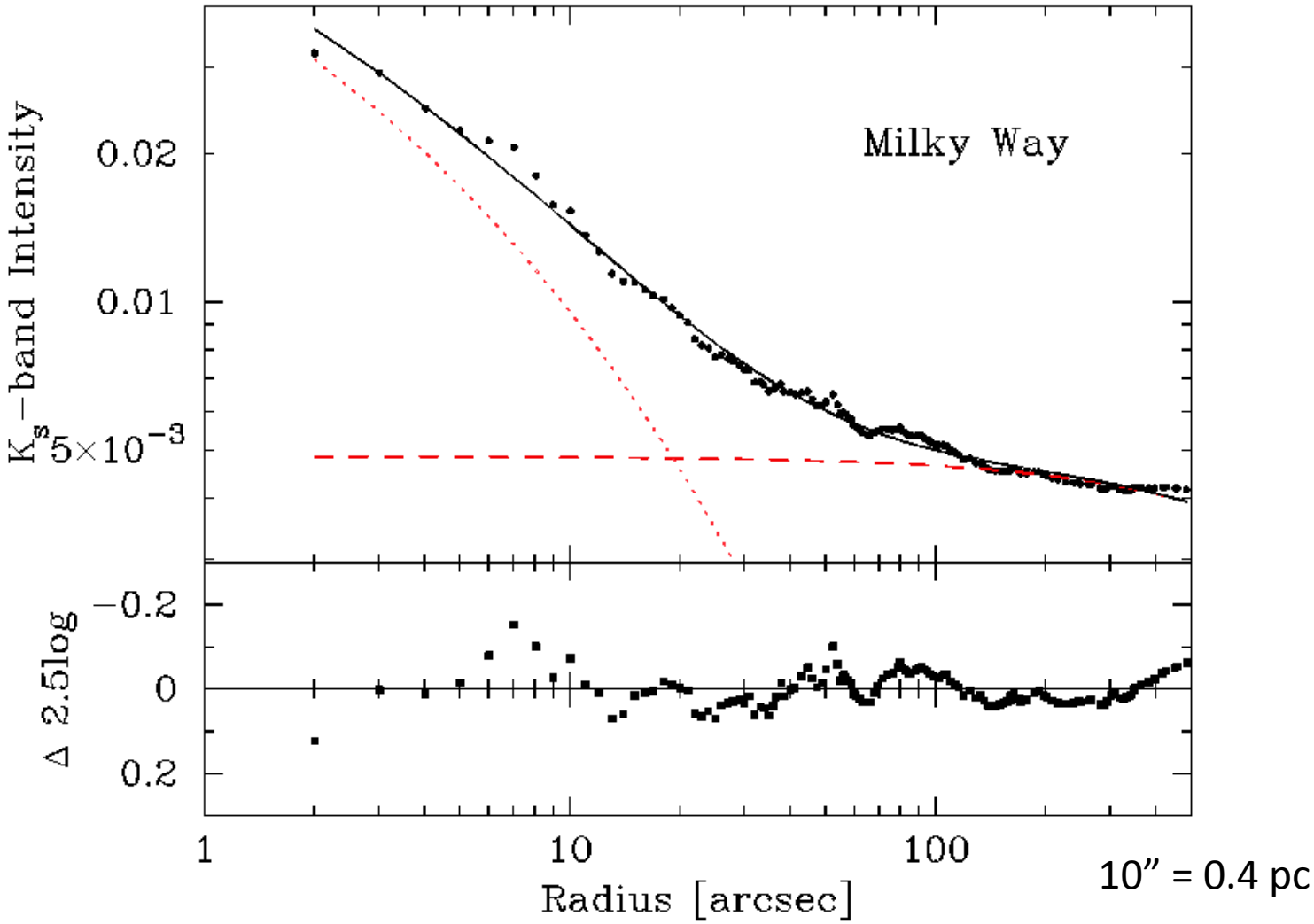
Using the Fundamental Plane's $M/L \sim L^{-0.3}$

Wehner & Harris (2006, ApJ, 644, L17): $M_{NC} \sim M_{bulge}^{1.0}$

Ferrarese et al. (2006, ApJ, 644, L21): $M_{NC}/M_{gal} \sim 0.002$



Our Milky Way (Graham & Spitler 2009, MNRAS, 397, 2148)

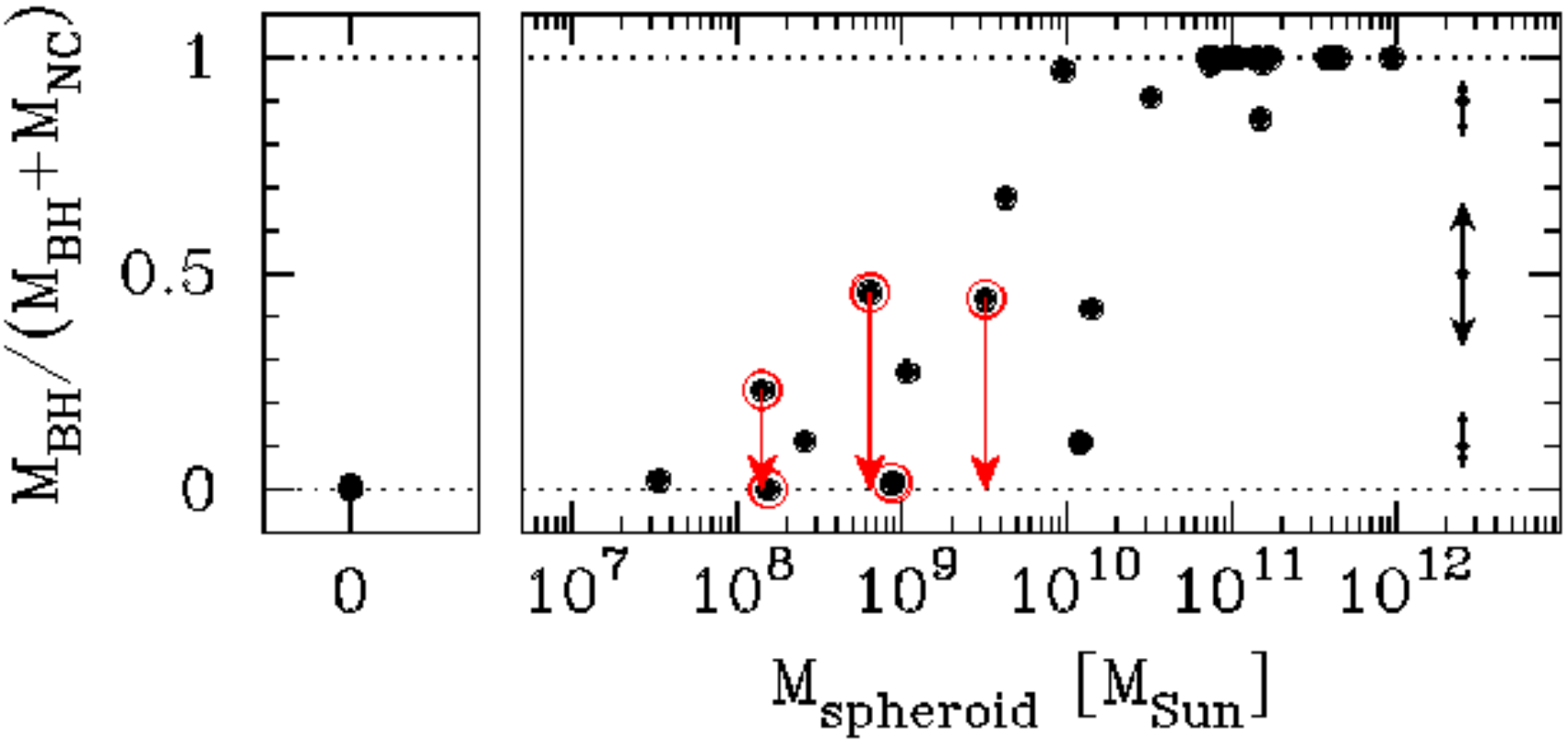


10” = 0.4 pc

See also Schödel (arXiv:1001.4238)

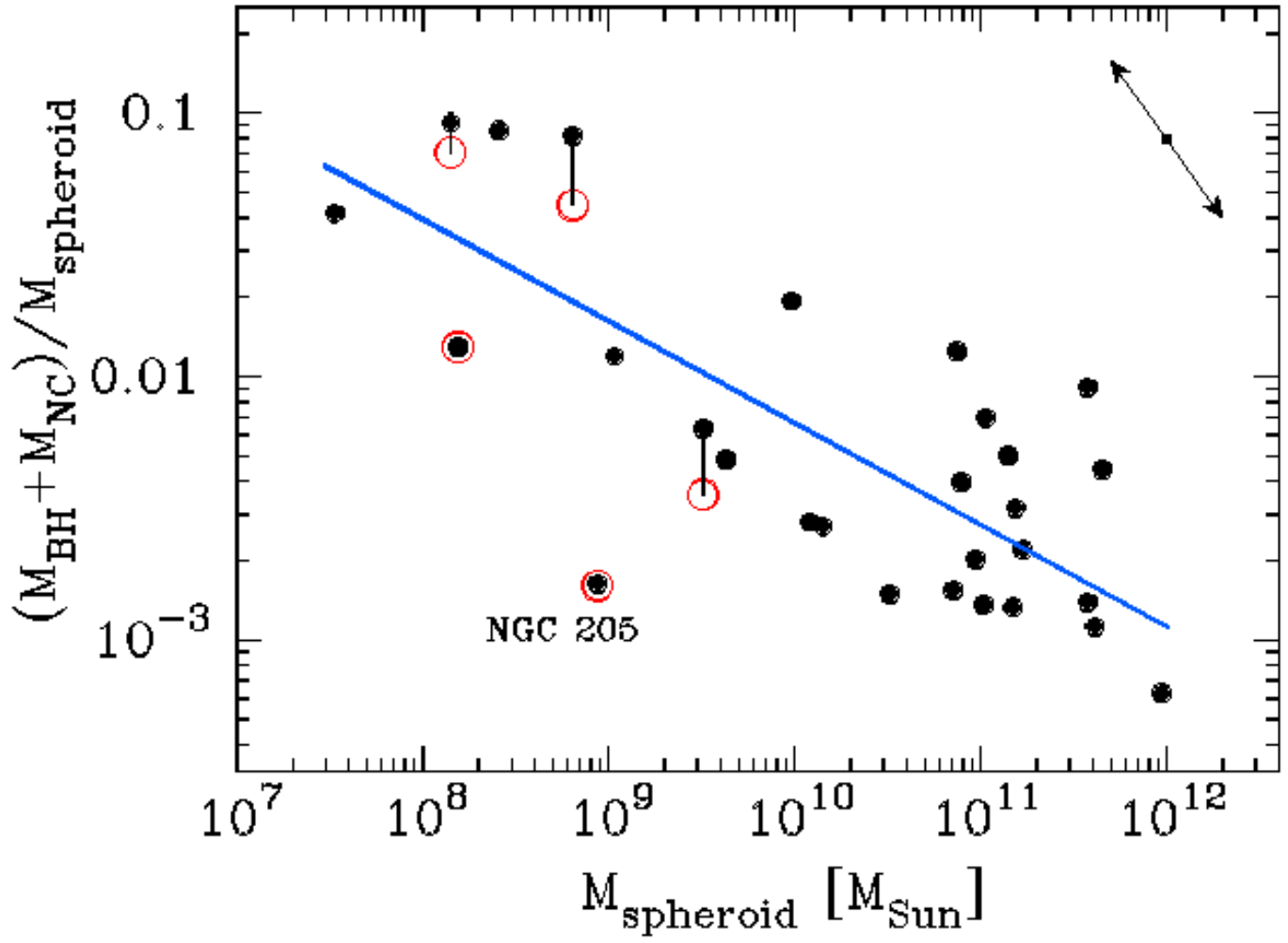
The BH to (BH+NC) mass ratio

Graham & Spitler (2009, MNRAS, 397, 2148)



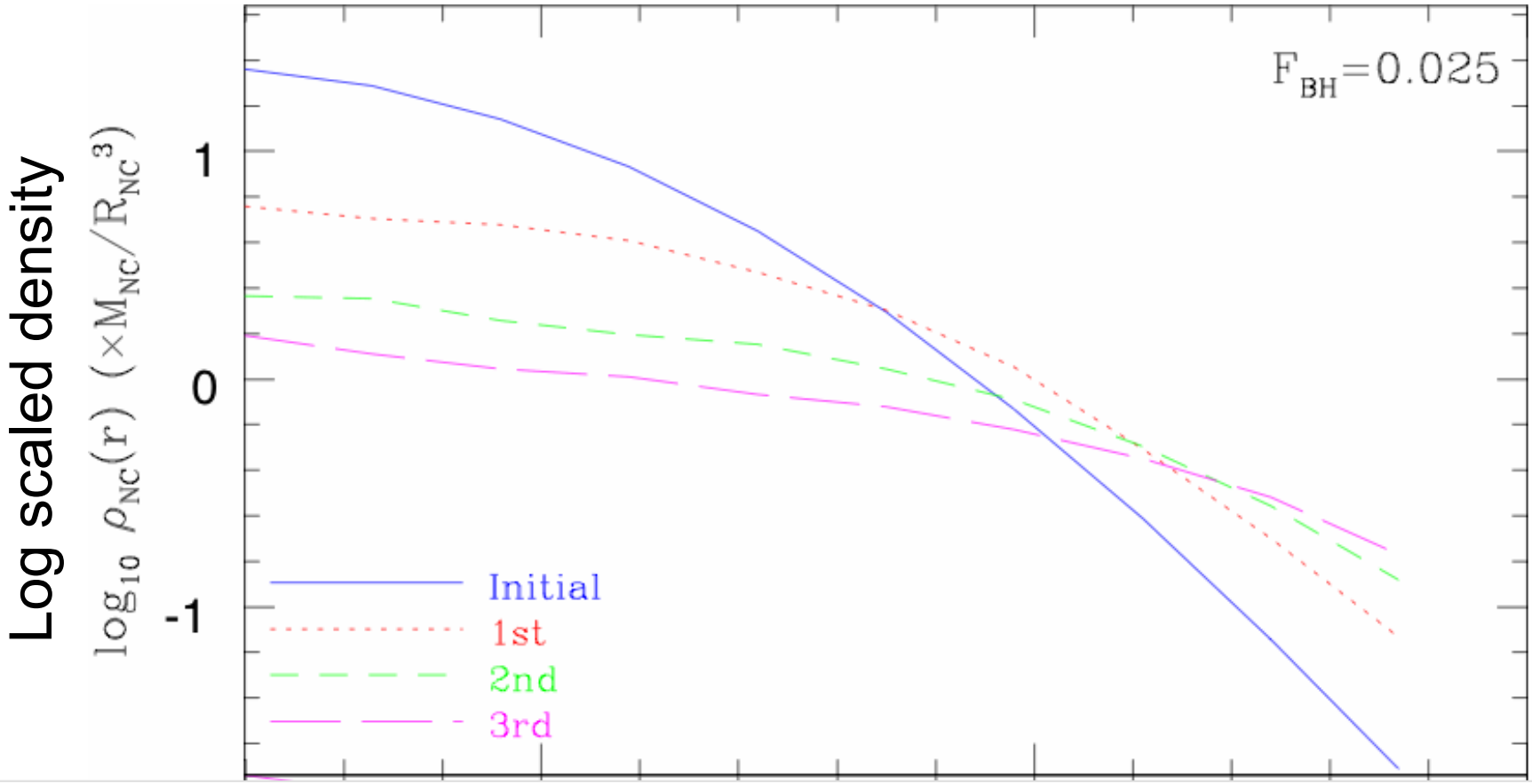
The (BH+NC)/spheroid stellar mass ratio

Graham & Spitler (2009, MNRAS, 397, 2148)



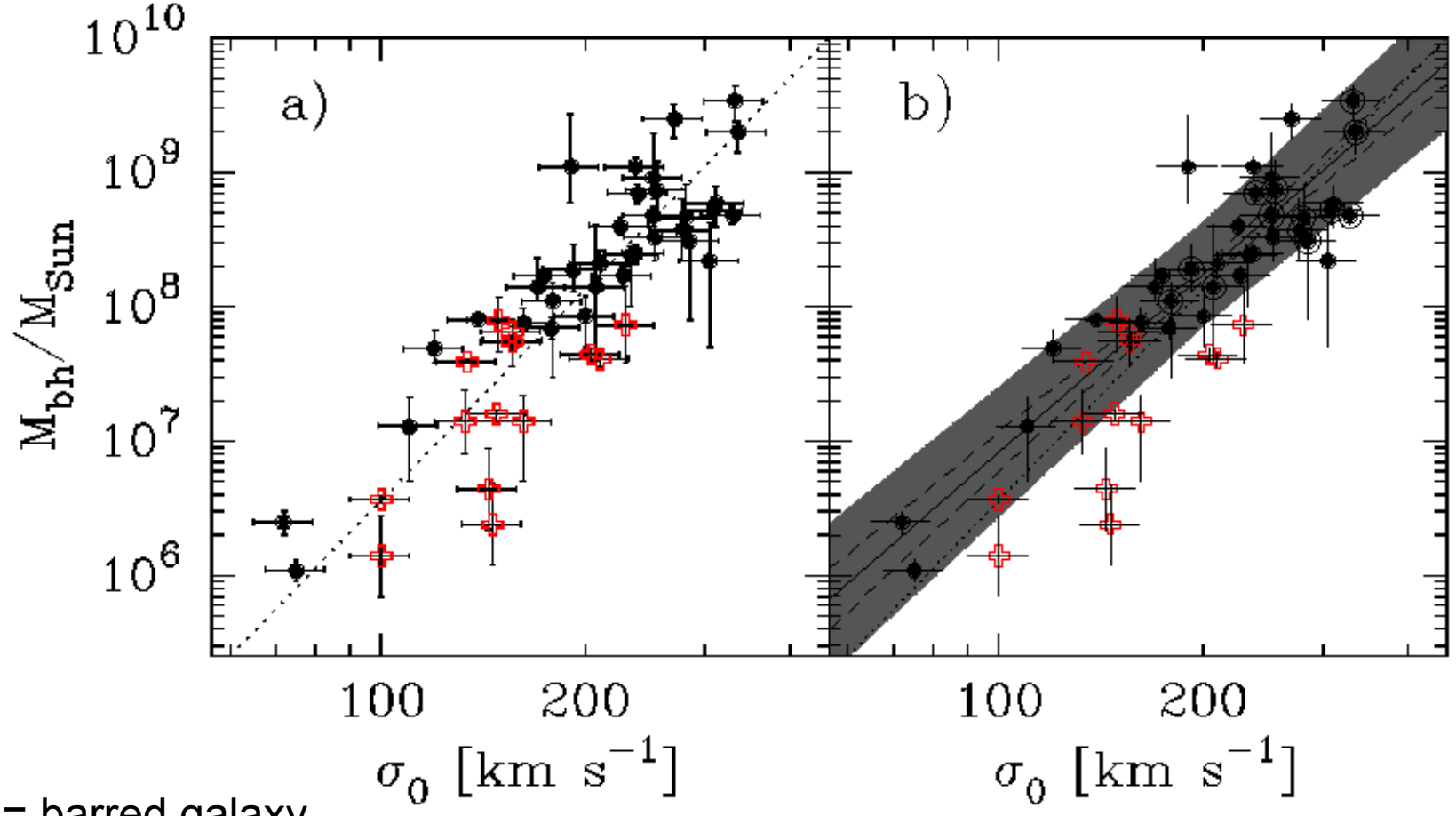
Simulations of merging NCs with MBHs

Bekki & Graham (2010, MNRAS, arXiv:1004.3627)



The M_{BH}–σ diagram (50 galaxies)

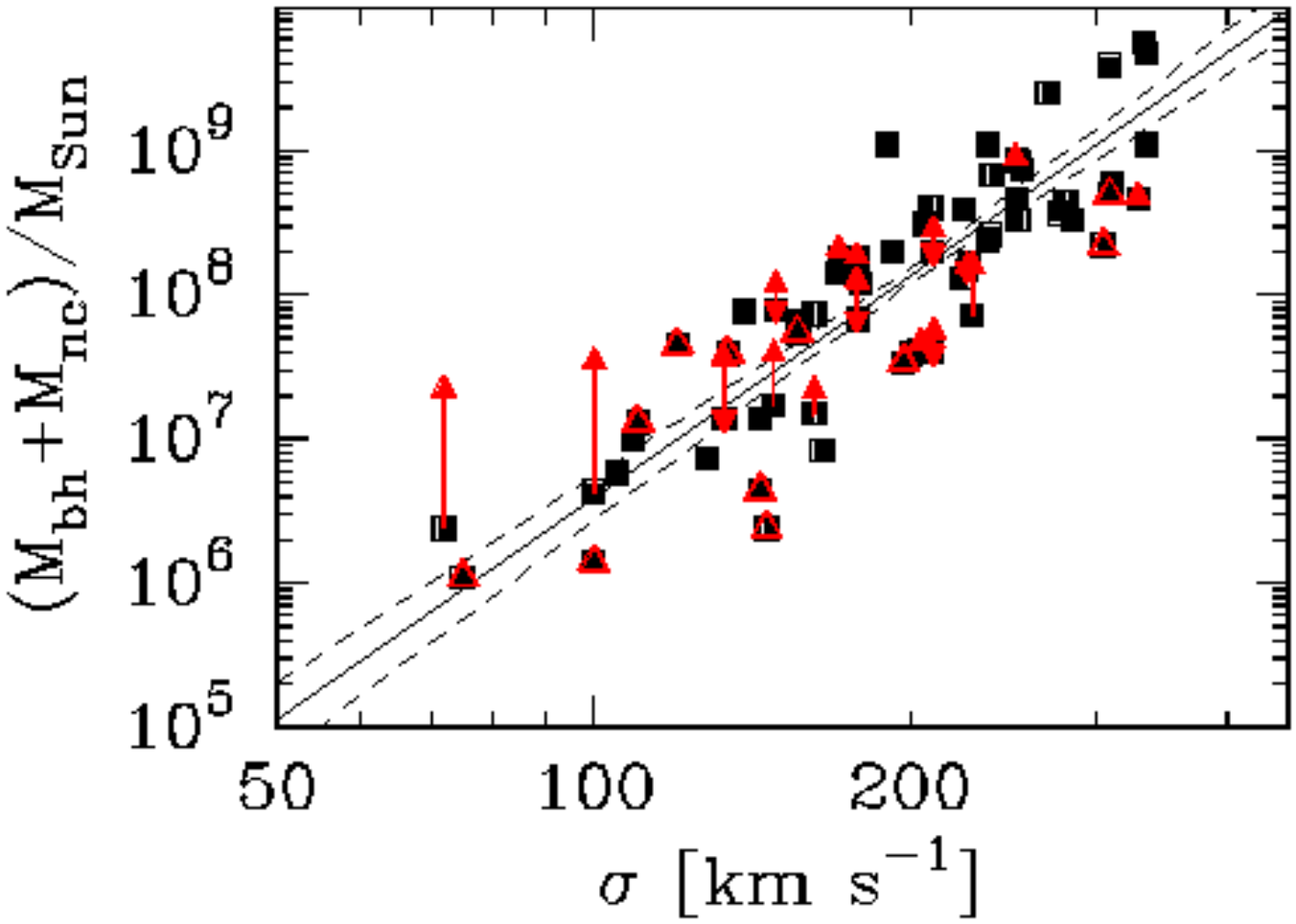
Graham (2008, PASA, 25, 167); Hu (2008, MNRAS, 386, 2242)



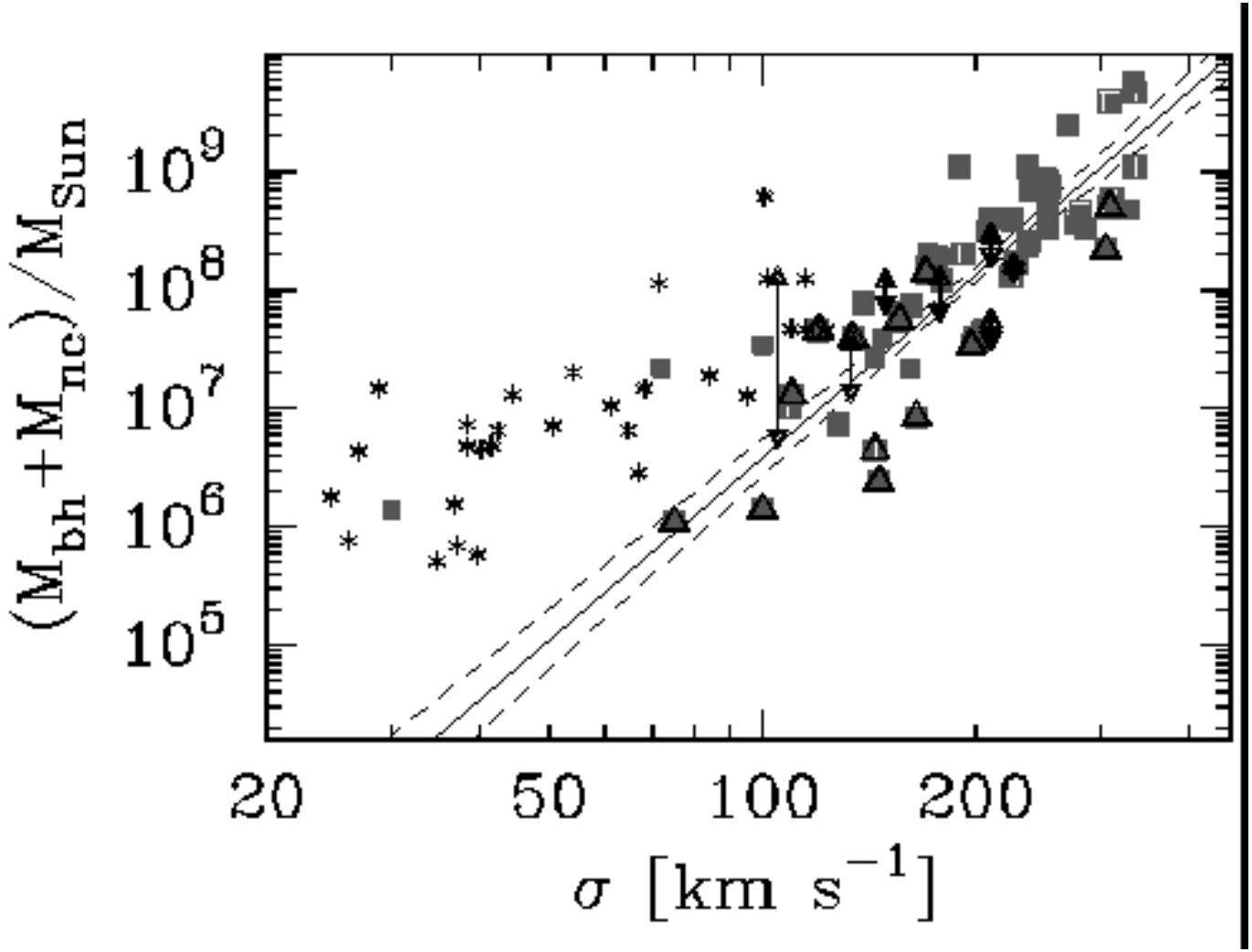
Red cross = barred galaxy

Right panel shows M-σ relation for non-barred galaxies (scatter 0.33 dex)

(BH+NC) mass versus host galaxy velocity dispersion



The (M_{bh}+M_{nc})-σ diagram



Summary

- NC fluxes correlate with their host bulge flux (2003-2005).

- NC masses correlate with their host bulge, and galaxy, mass (2006-2007).

- NC & BH coexist, and interesting new scaling laws have been found (2009-2010). Binary mergers may erode NCs, possibly explaining the NC-BH relations.

- Milky Way NC profile well approximated with Sersic's model…

-Barrred/pseudobulge/disc galaxies appear offset from (below) the M_{BH}-σ relation: maybe due to dynamics, or maybe due, in part, to ignoring the contribution from their NCs.