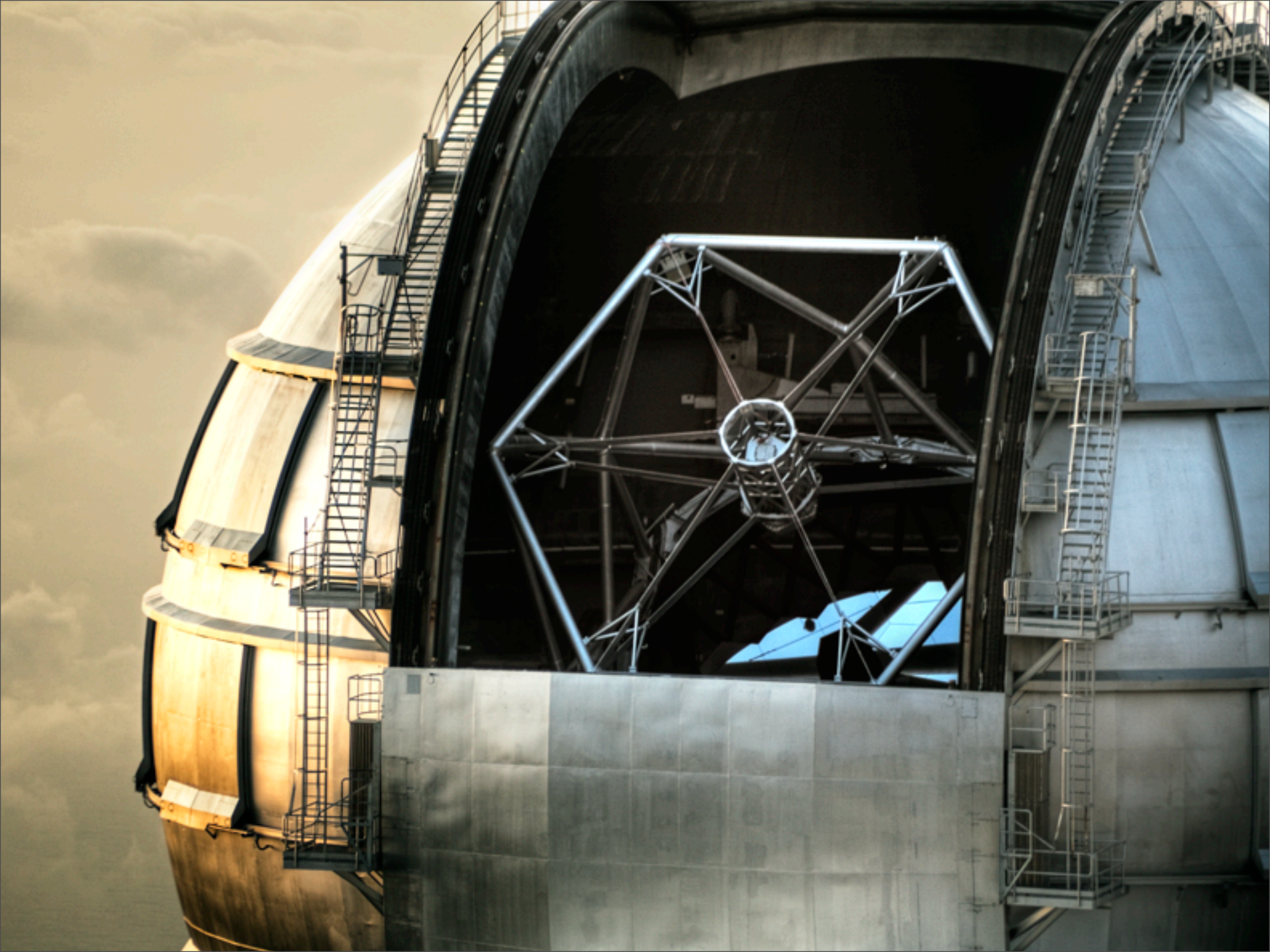

GTC/Osiris spectra of z~1 superdense **E/S0s**

Jesús Martínez, **Rafael** Guzmán
et al. (**UCM/IAC** collaborators)

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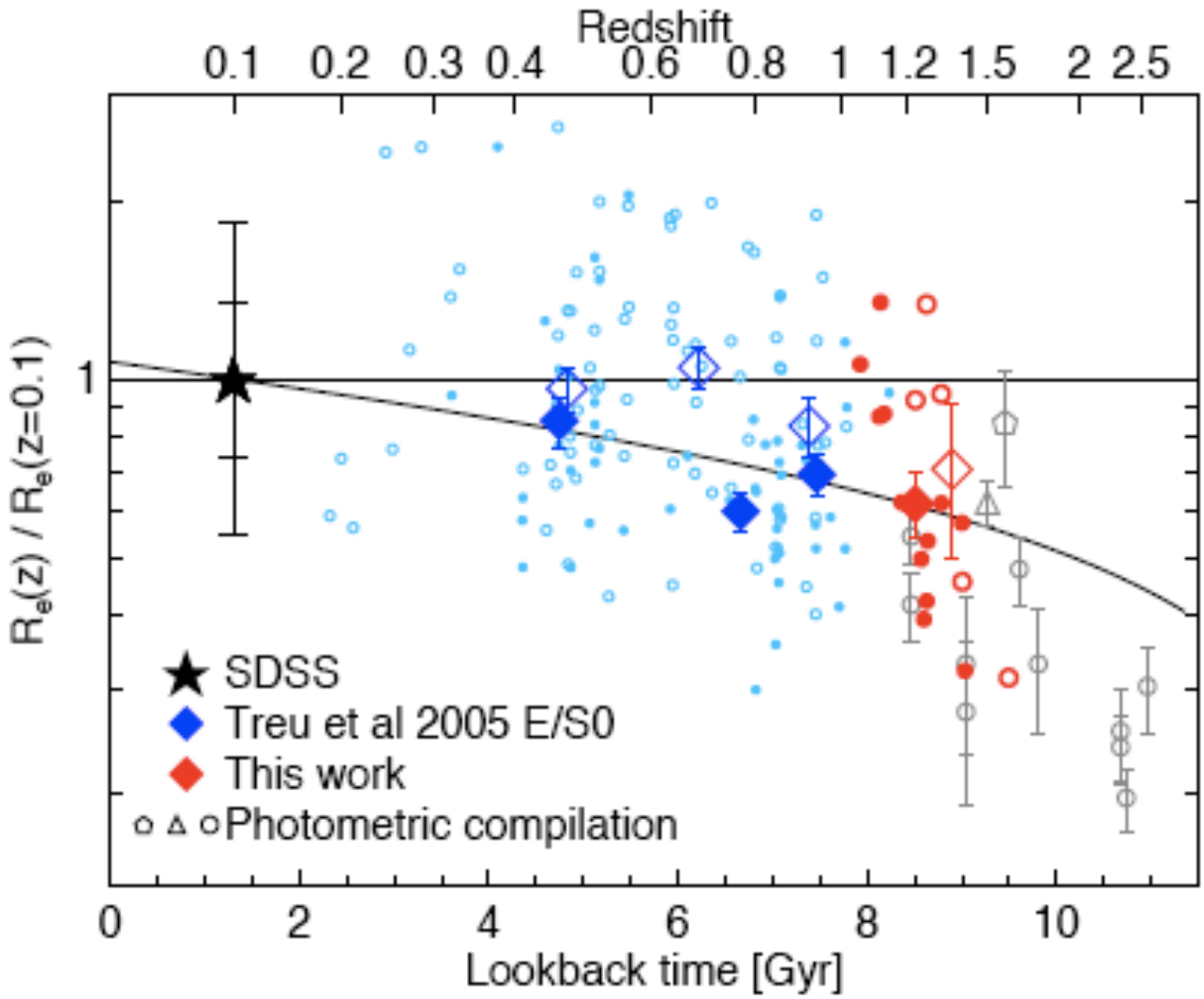
The Mass-Size Relation



$$M_{dyn} \propto R_{eff}\sigma^2$$

σ >400 km/s

(Trujillo+ 07; Pérez-González+ 08; cf. Mancini+10)

(van Dokkum+ 09,10; Cimati+ 09; Cenarro & Trujillo10; Newman+10)

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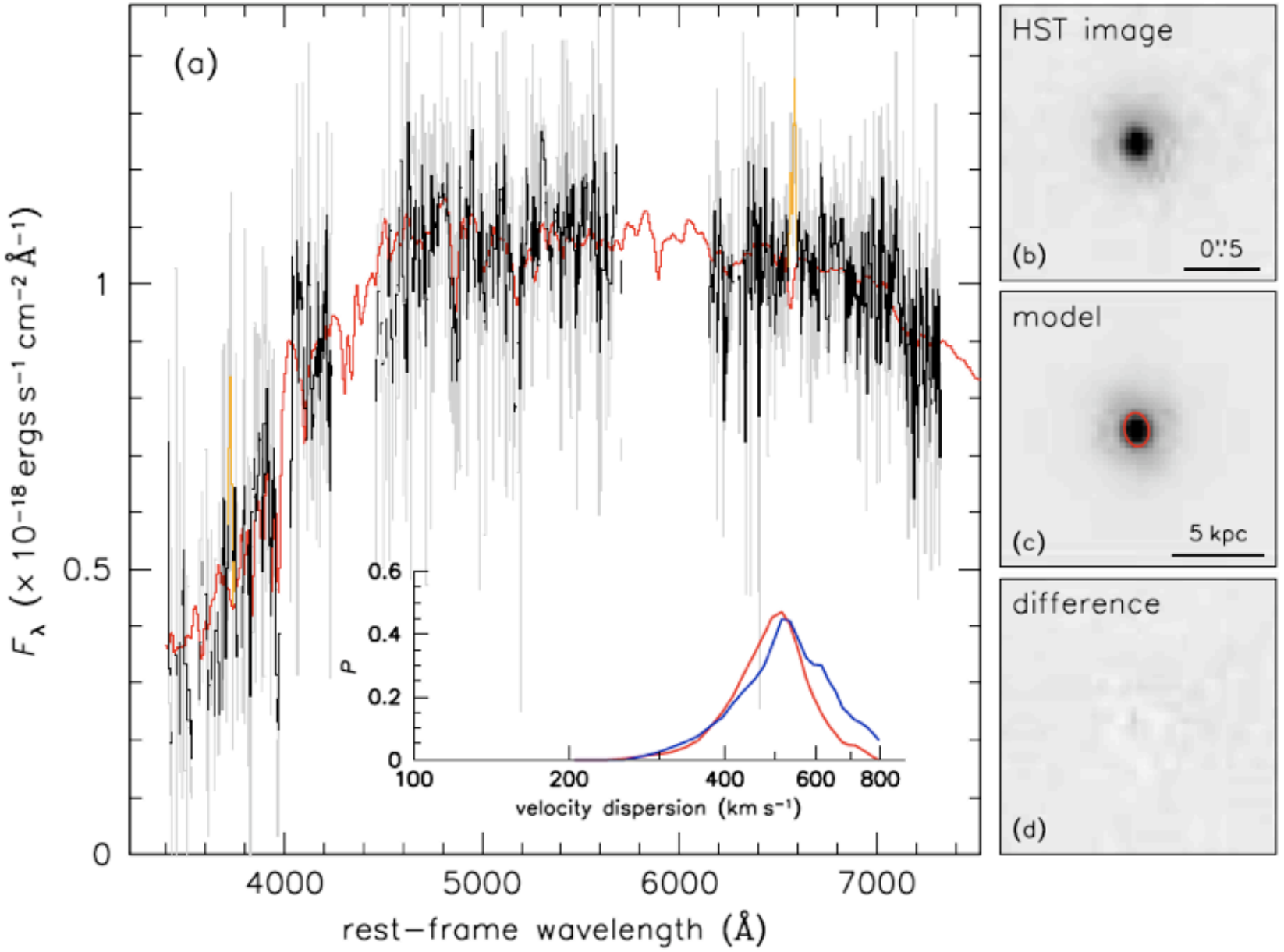
The Mass-Size Relation



(van Dokkum+ 09, 10: σ ~500 km/s)

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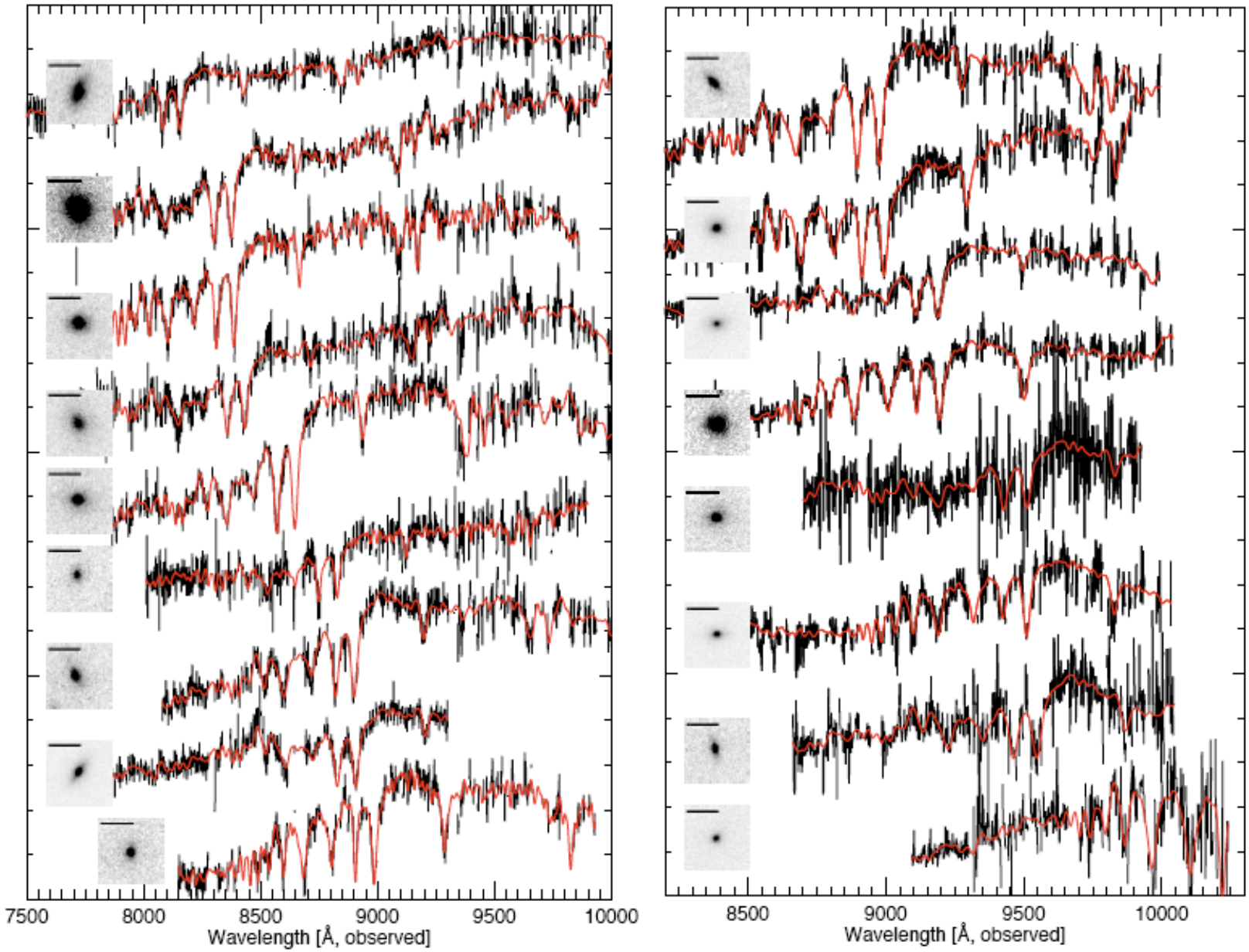
The Mass-Size Relation



(Newman+ 10: σ ~150 - 300 km/s)

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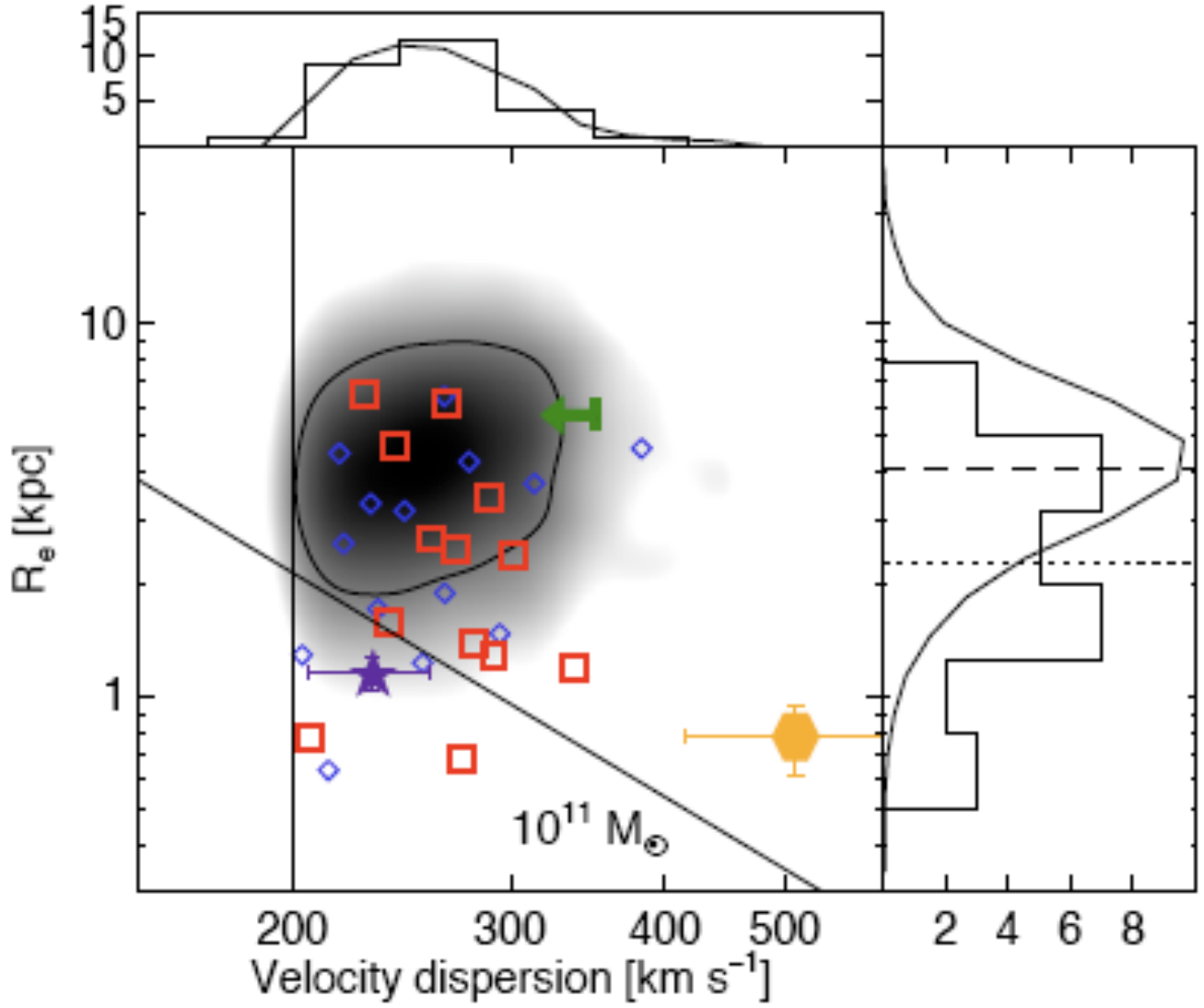
The Mass-Size Relation



(Newman+ 10: σ ~150 - 300 km/s)

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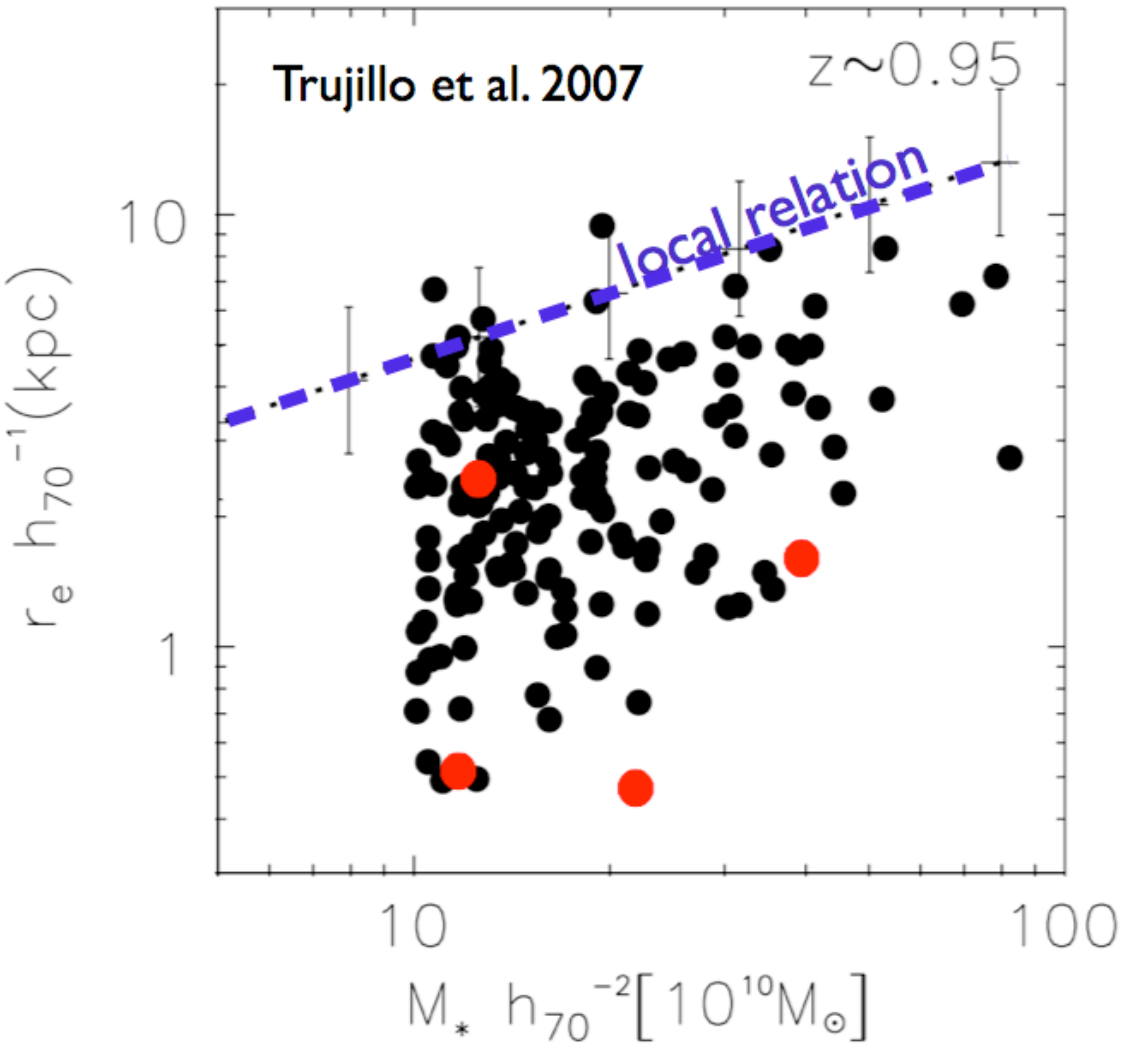
GTC/Osiris Spectra of E/S0s at z~1



"Superdense" massive E/S0s at z~1: M_{star}>10^{11}Mo, lowest Re at a given M

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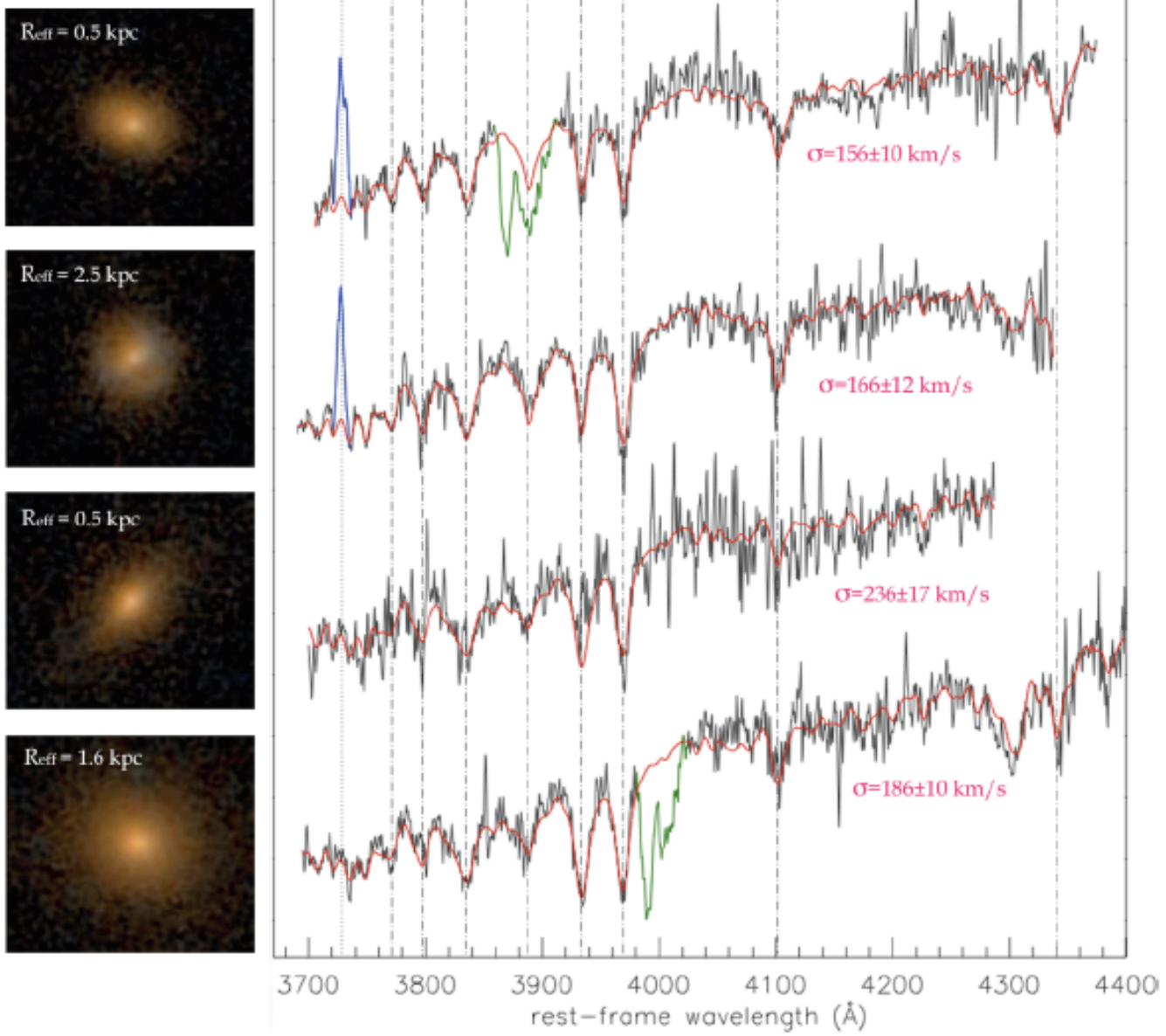
GTC/Osiris Spectra of E/S0s at z~1



- σ_{ave} ~190 km/s:
  - $M_*\downarrow$, $R_e\uparrow$ ~x6
  - ($v_r \sin i$<100 km/s)
- age ~1-2 Gyr:
  - z_{form} ~1.5
- [OII]$_{3727}$:
  - SFR ~7 Mo/yr
  - SFR_{MIR} ~15 Mo/yr

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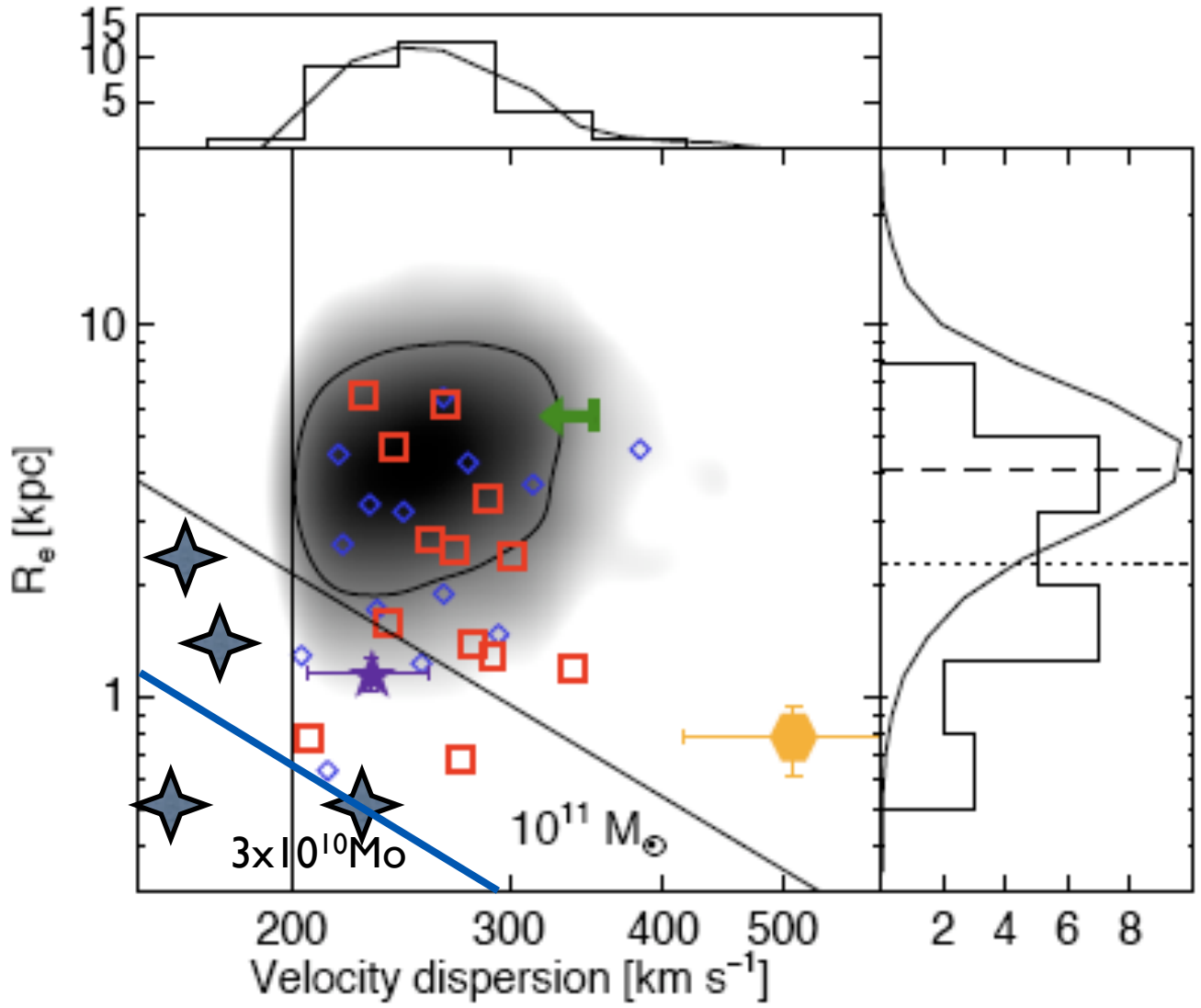
The Mass-Size Relation



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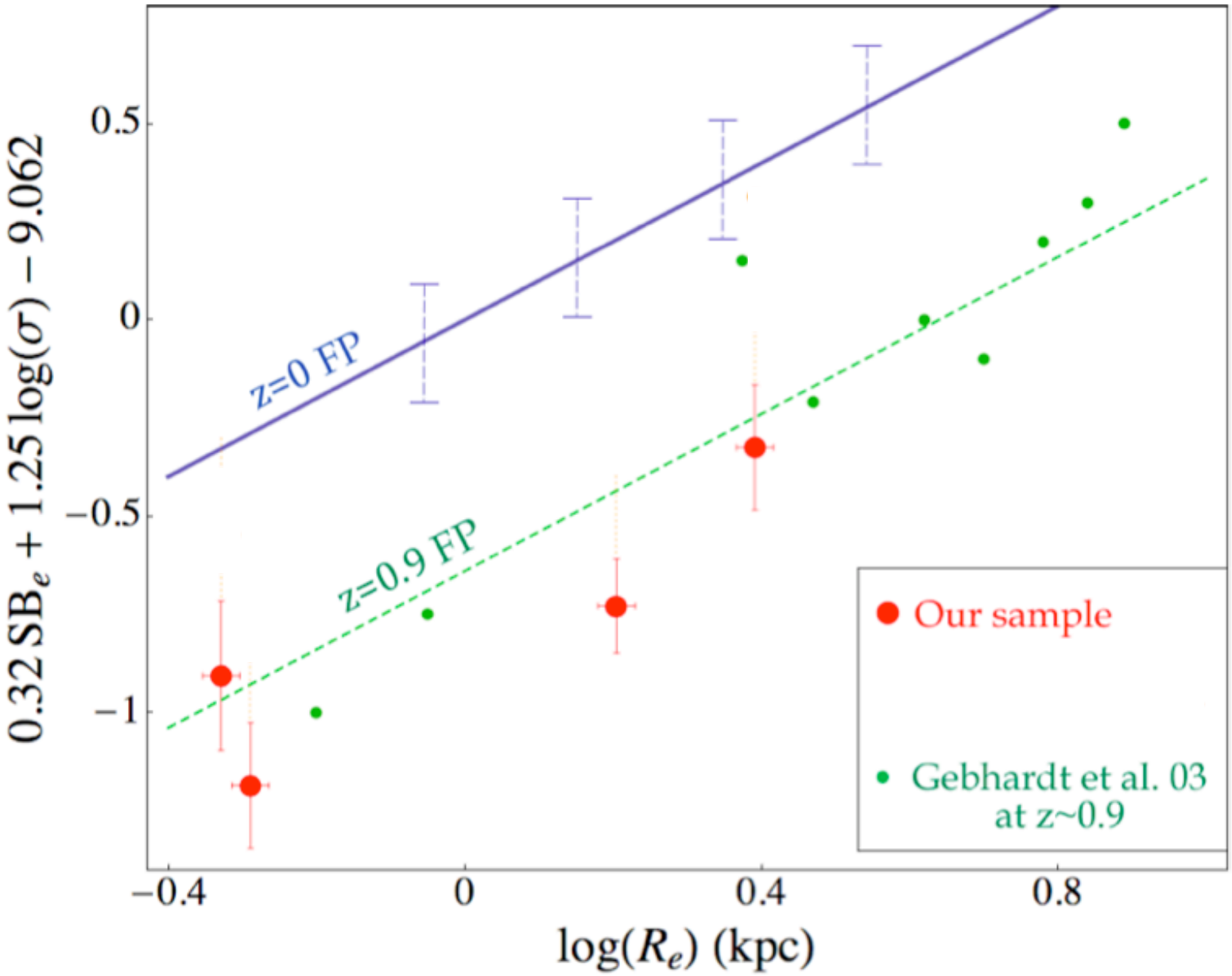
Fundamental Plane



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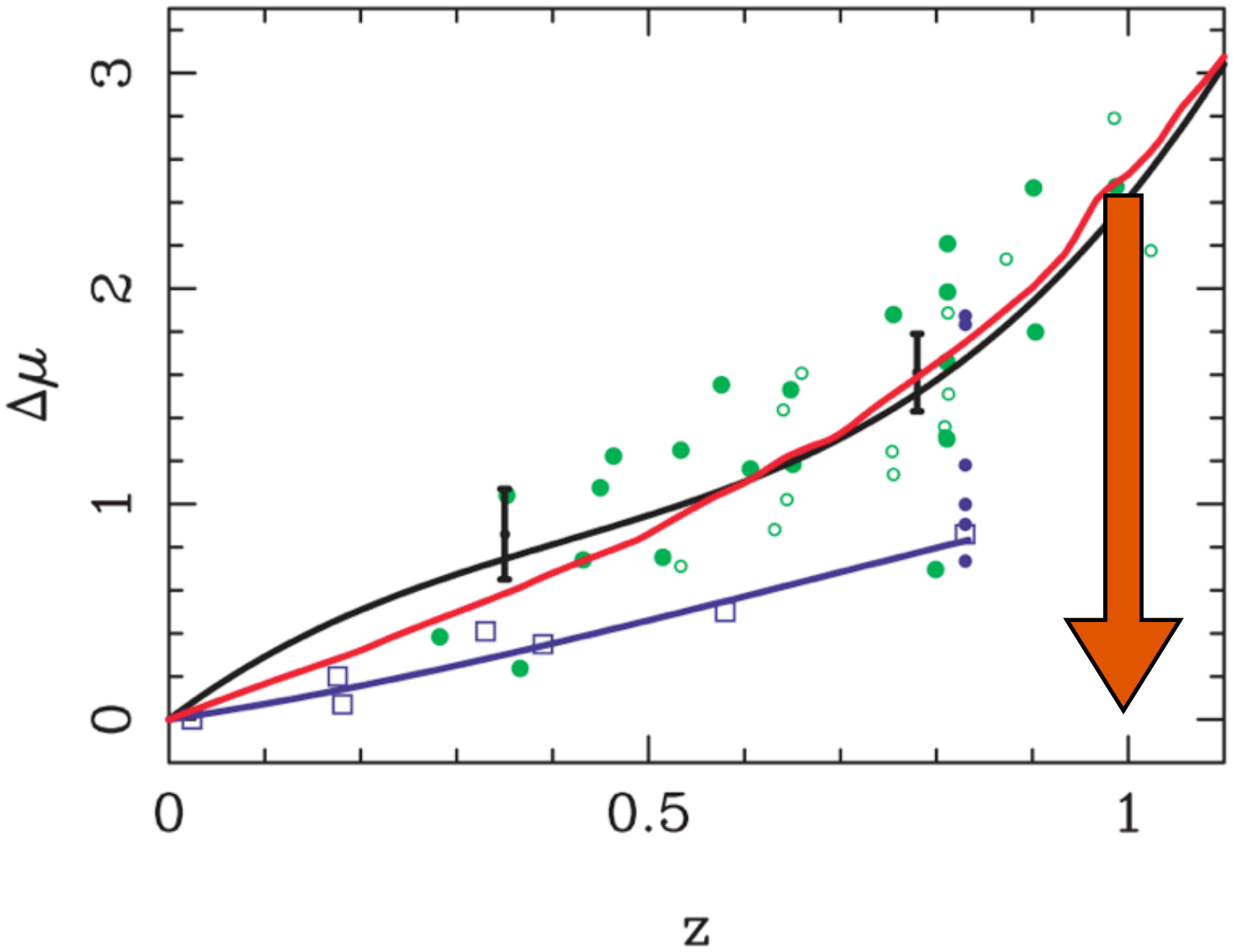
Passive Luminosity Evolution



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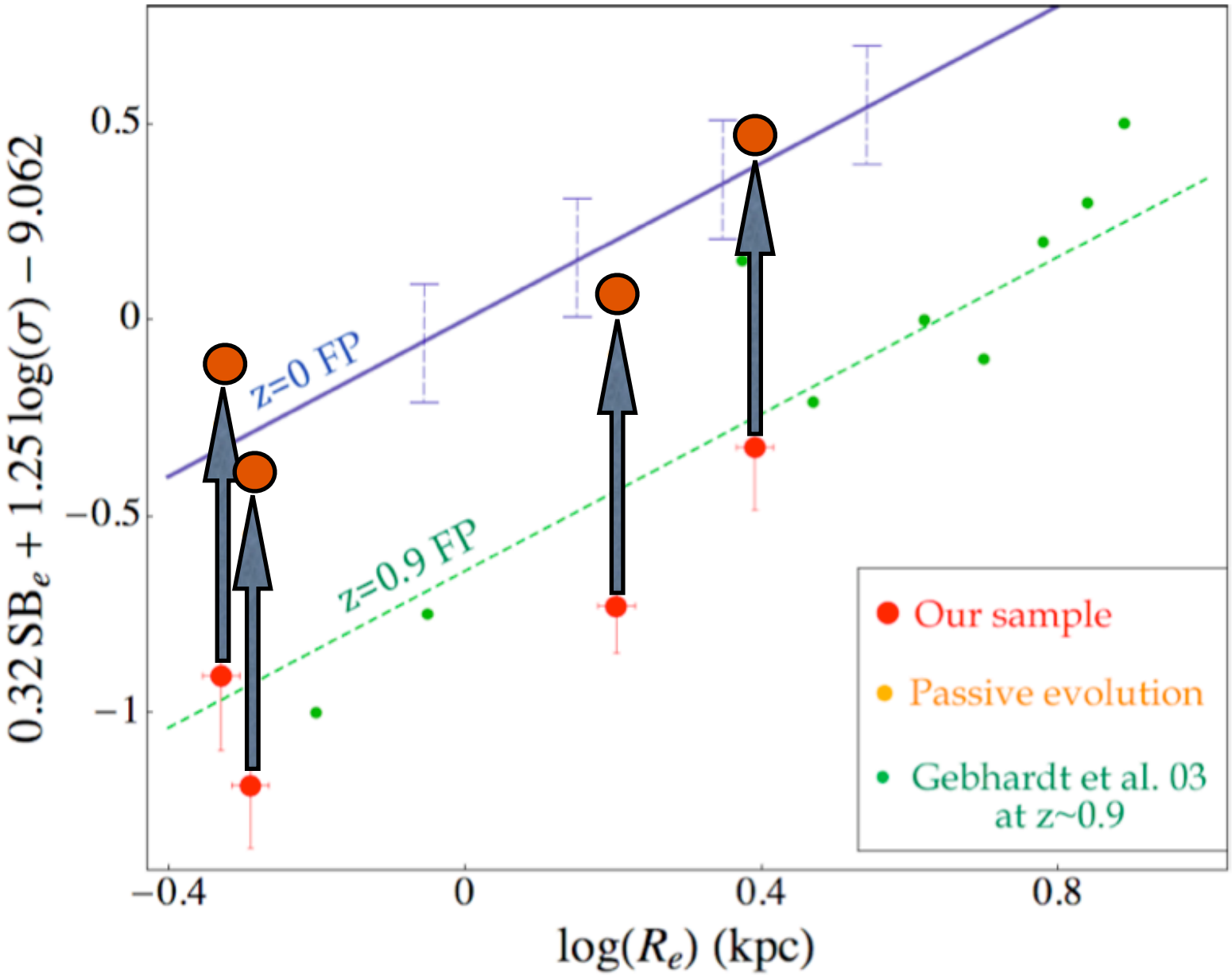
FP Evolution: fading



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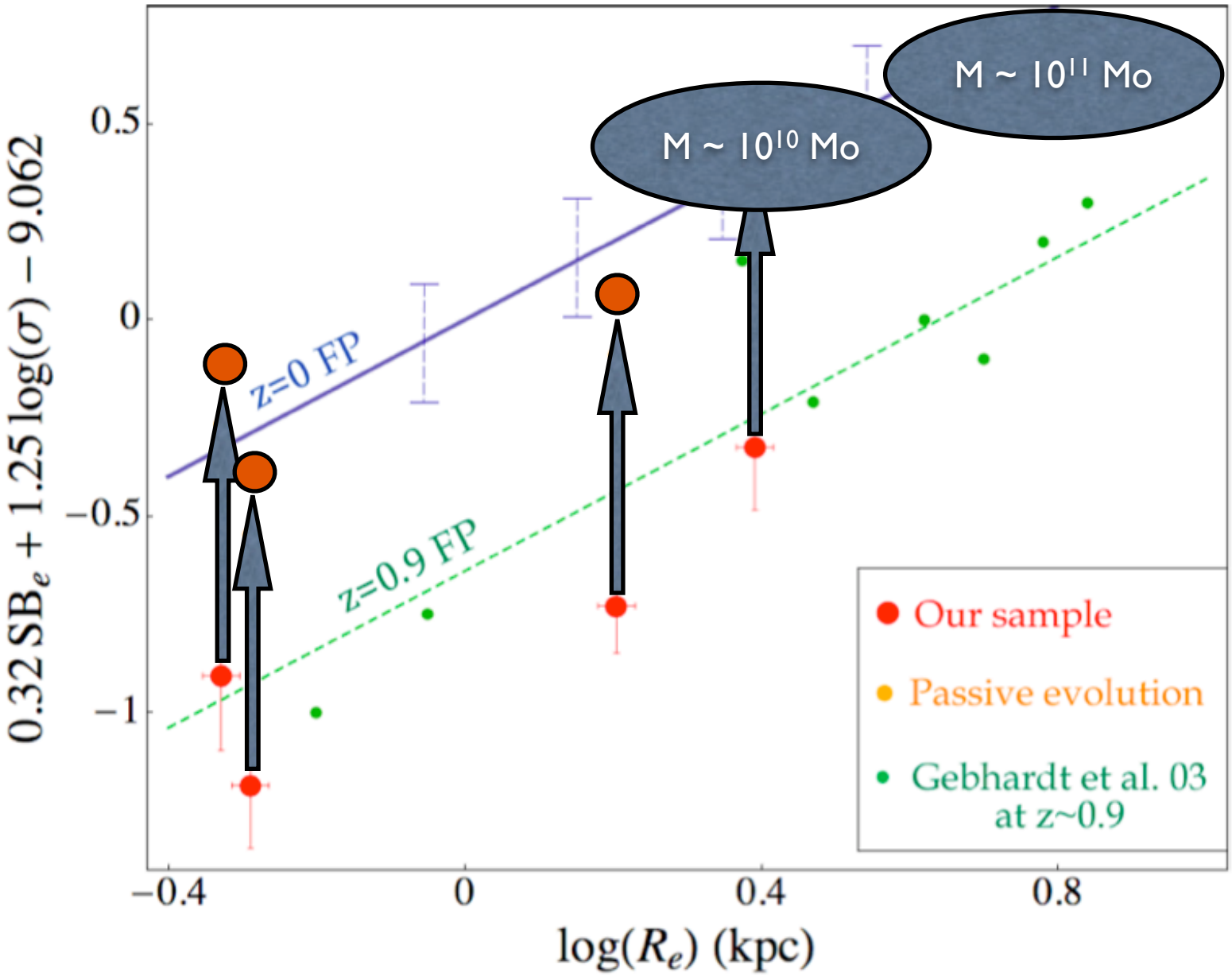
FP Evolution: fading



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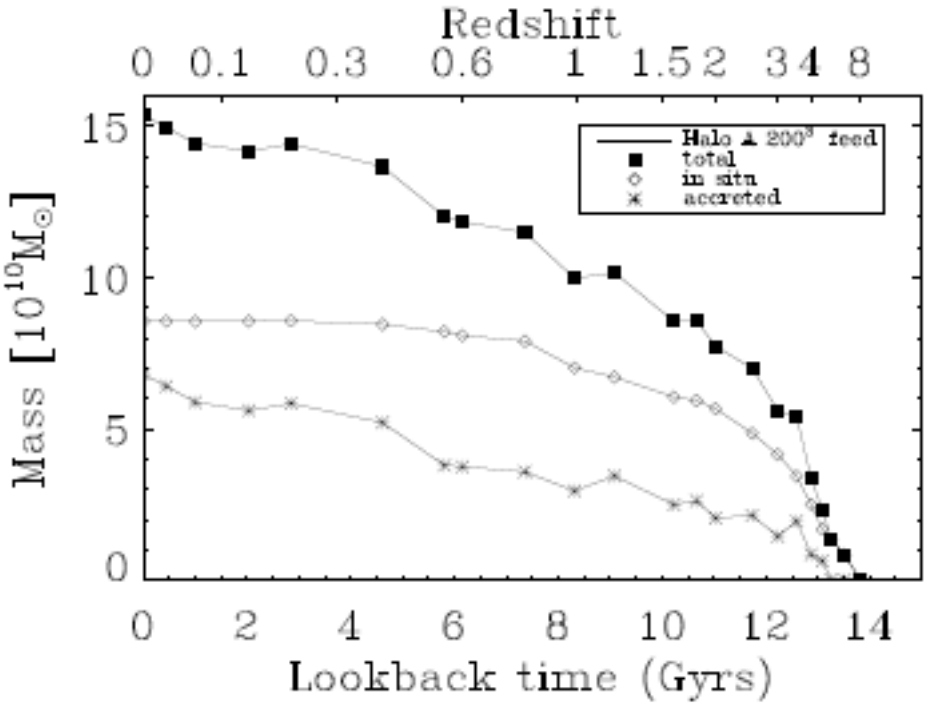
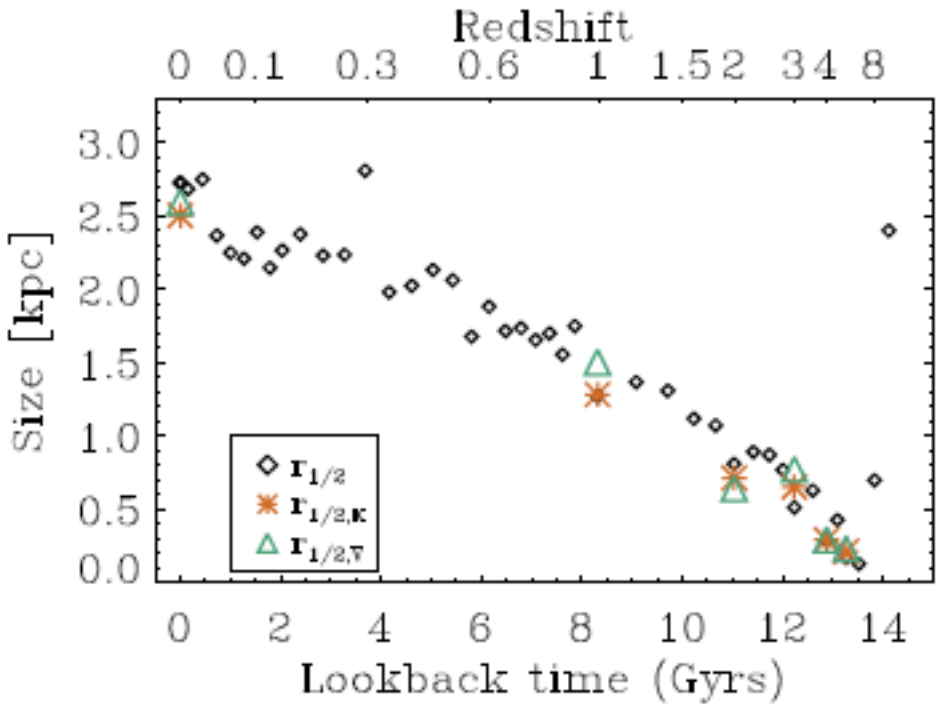
Mass/Size Evolution: minor mergers





Minor dry mergers since z~1:

$\Delta M \sim x1.5$, $\Delta Re \sim x1.8$, $\Delta\sigma \sim x0.8$

(Naab et al. 2009)

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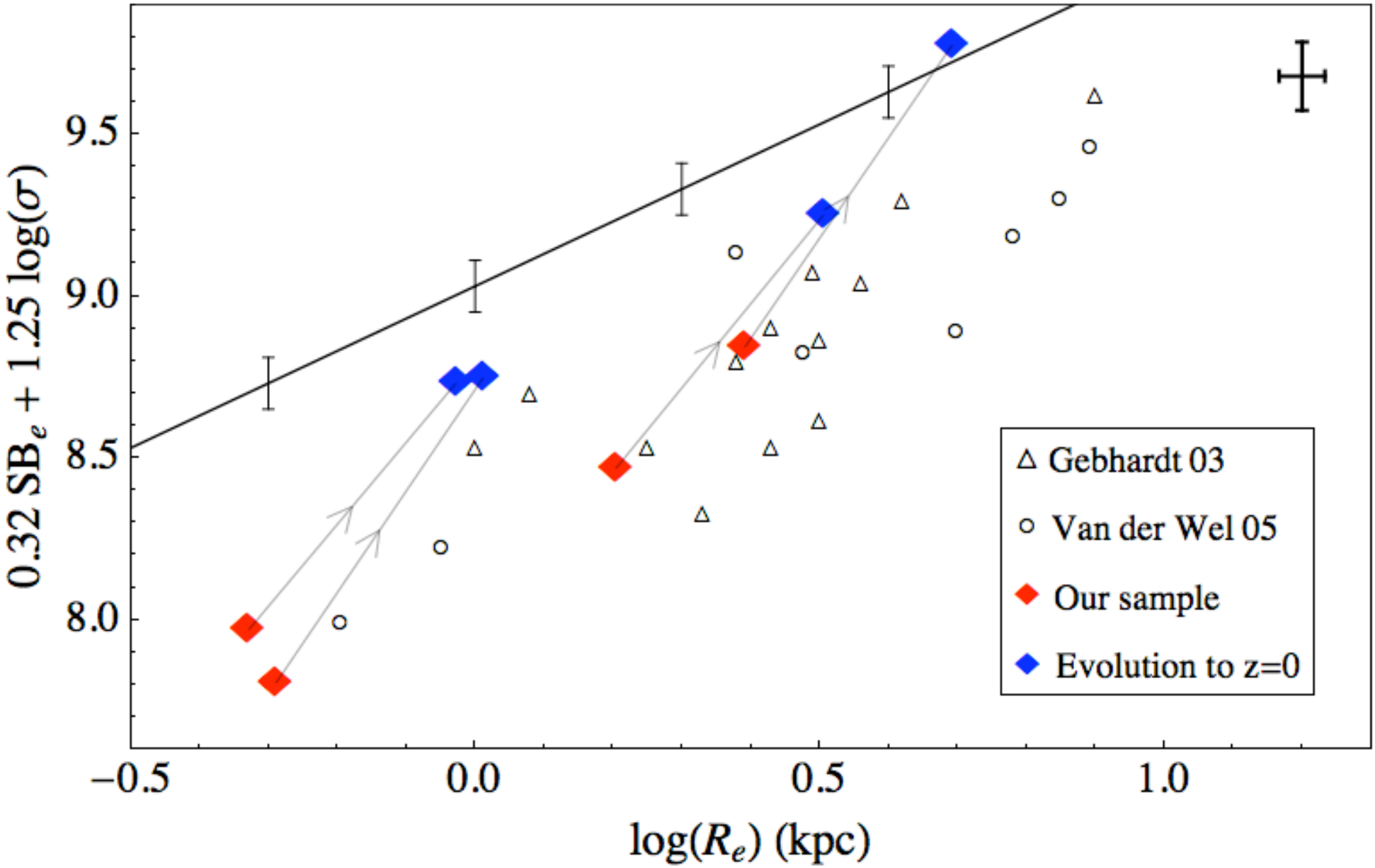
FP Evolution: mass, size & fading



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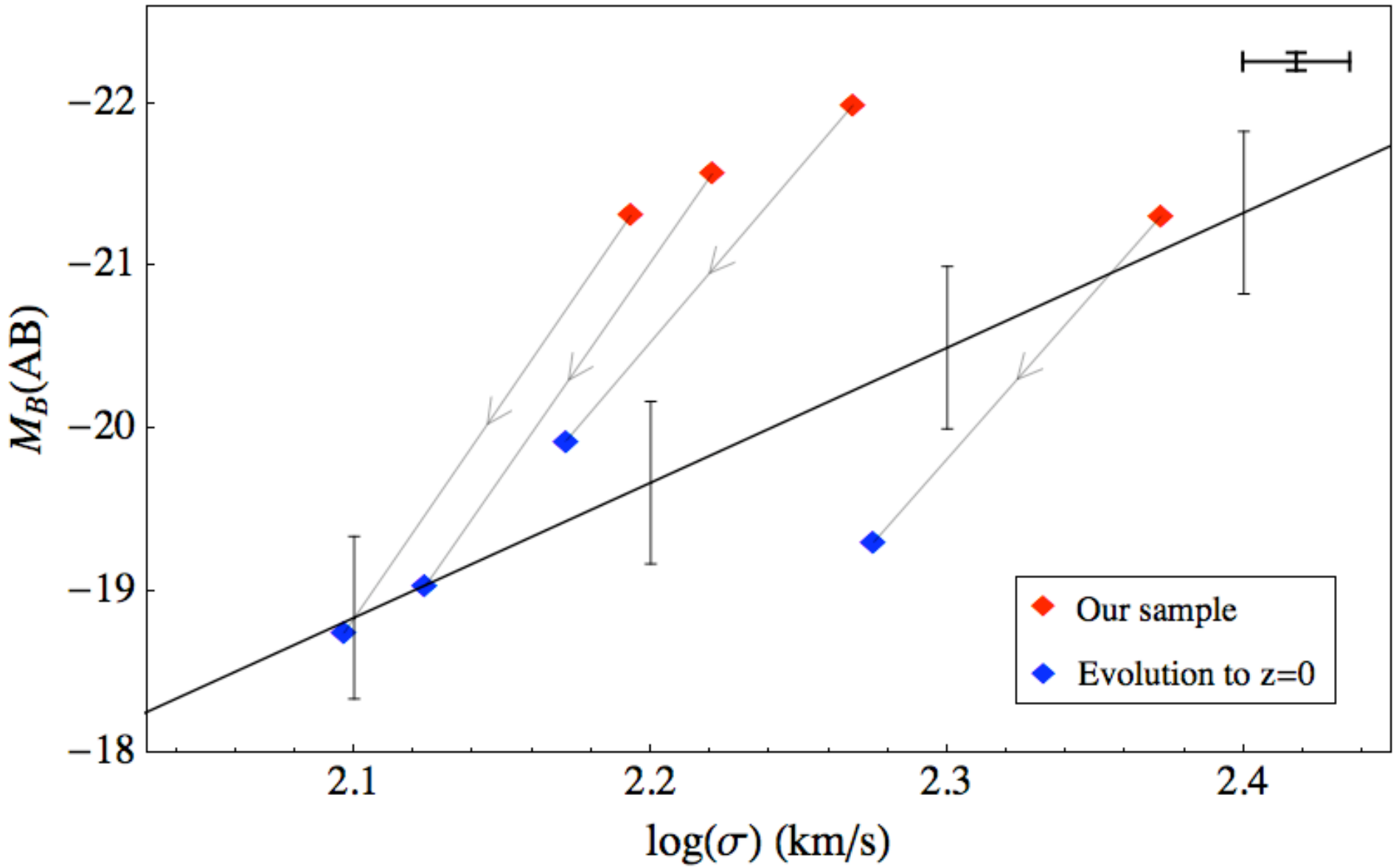
FJ Evolution: mass & fading



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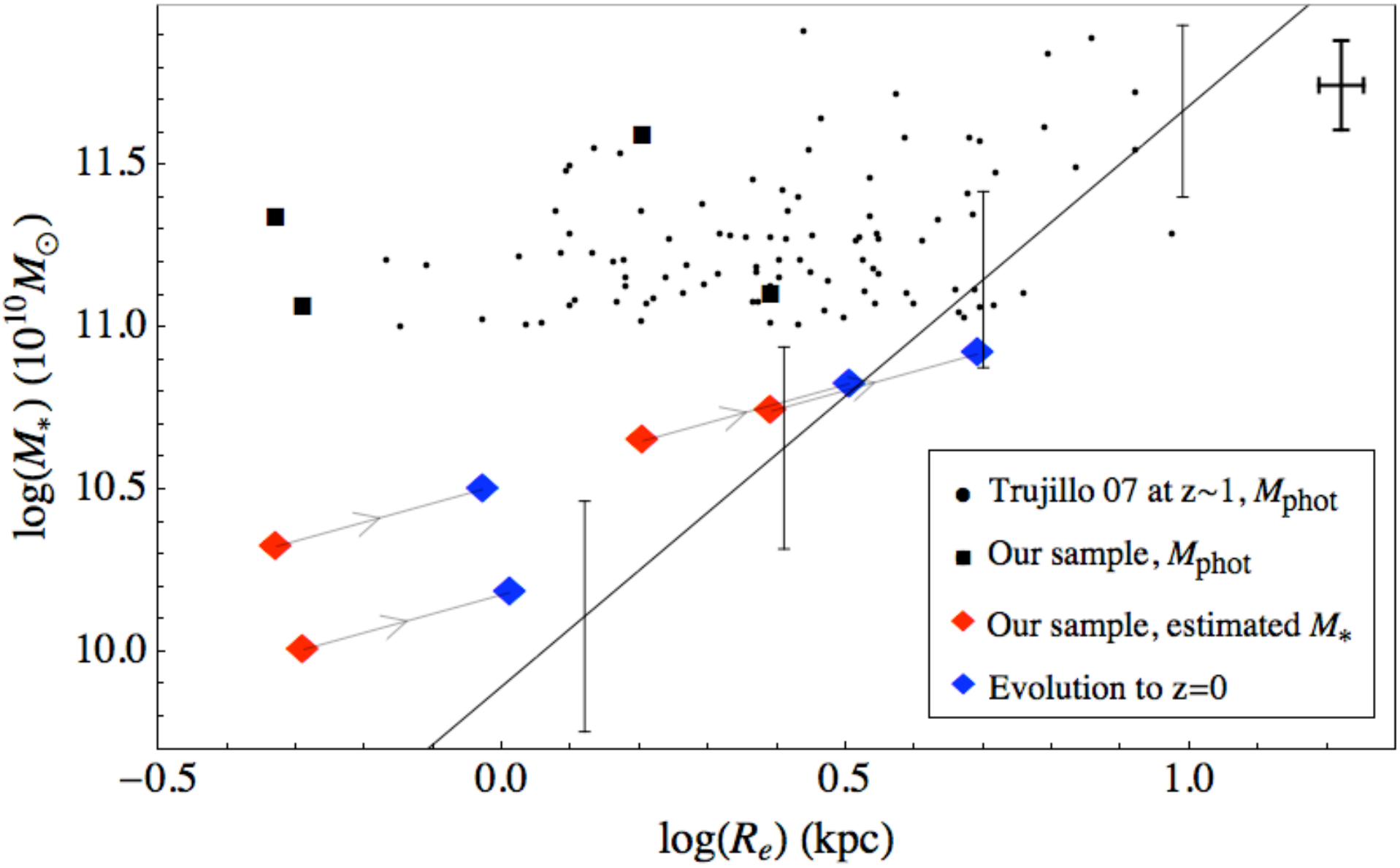
M-Re Evolution: mass, size



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Summary

- GTC spectra of 4 superdense E/S0s at z~1:
- σ ~190 km/s:
  - M_{star} ↓ ~ x6
- average age: ~1-2 Gyr
- $[OII]_{3727}$ (+MIR) emission: SFR ~10-20 Mo/yr
- FP, F-J and M-Re analysis consistent with a simple evolutionary scenario from z~1 to z~0:
  - Fading: ΔM_B ~ 2.4 mag
  - Minor mergers: ΔM ~ x1.5, ΔRe ~ x1.8, $\Delta\sigma$ ~ x0.8

(see Martínez, Guzmán+ 11, ApJL, in press, astro-ph arXiv:1107.4640)

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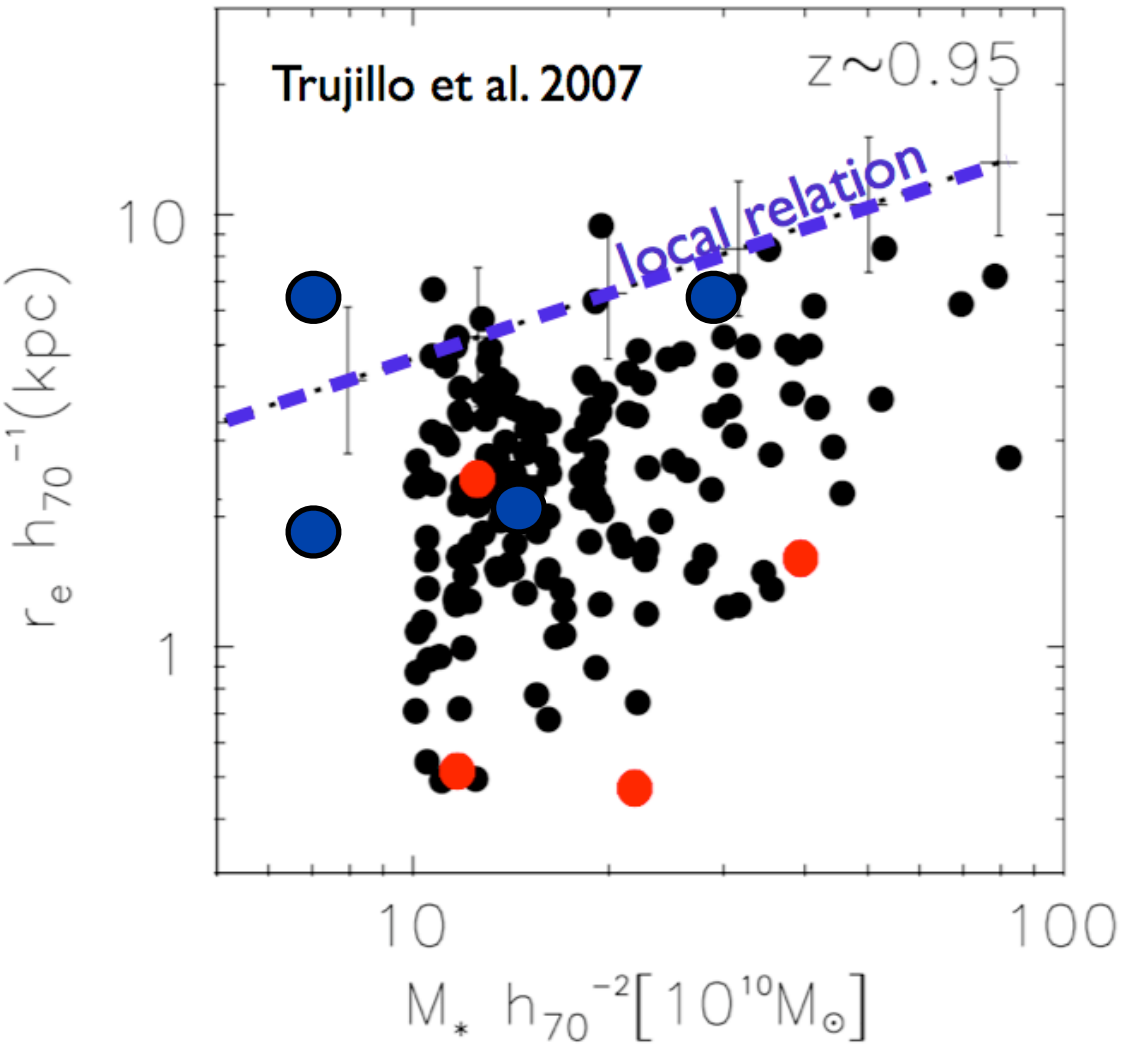
The Mass-Size Relation



Re(z=0) ~ 2.5 Re(z=1)

~ 4 Re(z=2)

V.T.: $M_{dyn} \propto R_{eff}\sigma^2$.

$M_* \sim M_{dyn}$: σ ~600 km/s

(Trujillo et al. 07; Pérez-González et al. 08; cf. Mancini et al. 10)

(van Dokkum et al. 09, 10; Cimati et al. 09; Cenarro & Trujillo 09)

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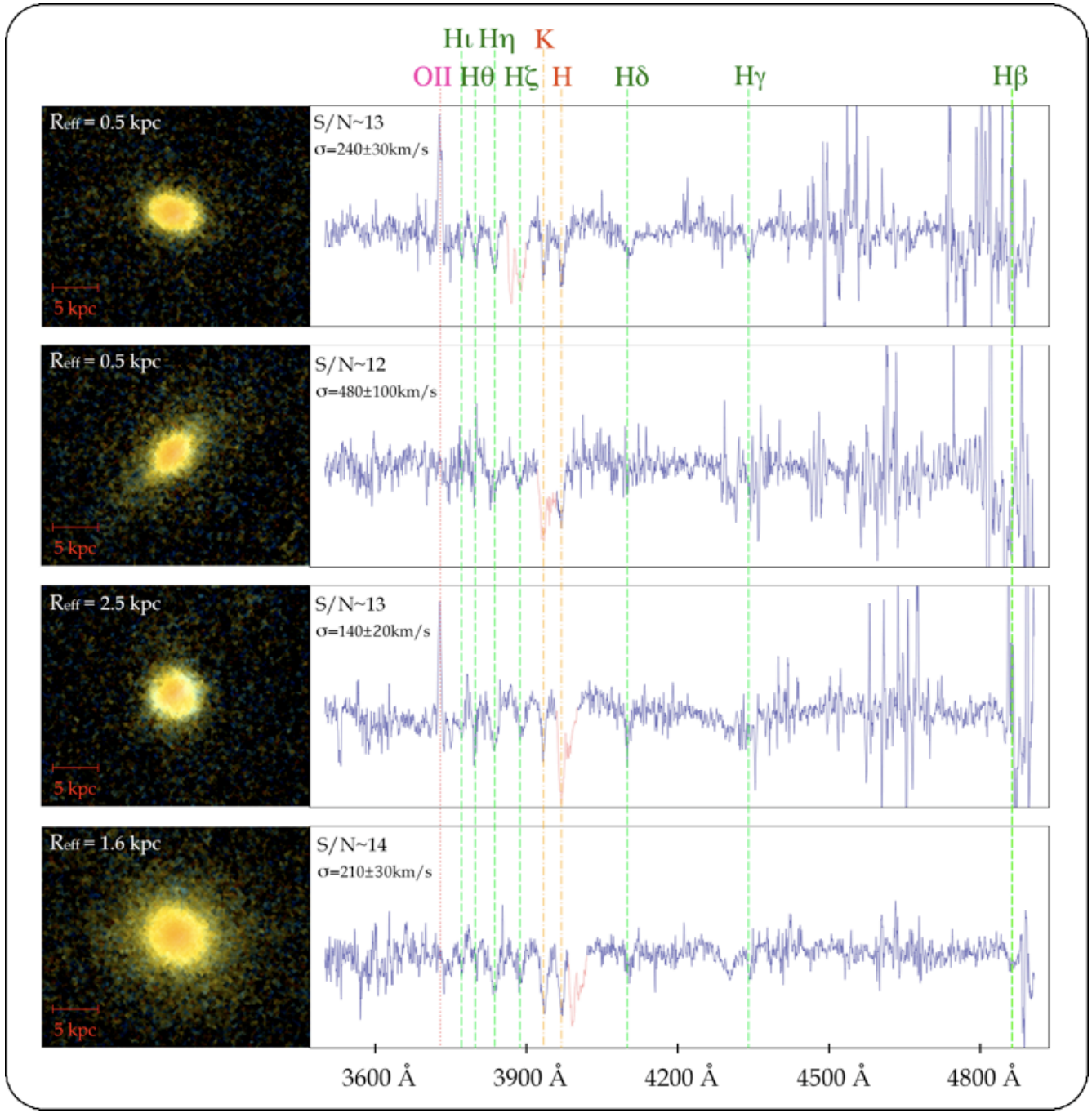
GTC/Osiris Spectra of E/S0s at z~1



- σ ~250 km/s:
  - ▶ M_*↓, Re↑~x2
  - ▶ v_r~400 km/s

  (v_r sini<100 km/s)
- age ~1-3 Gyr:
  - ▶ z_{form} ~1.5
- $[OII]_{3727}$:
  - ▶ SFR ~7 Mo/yr

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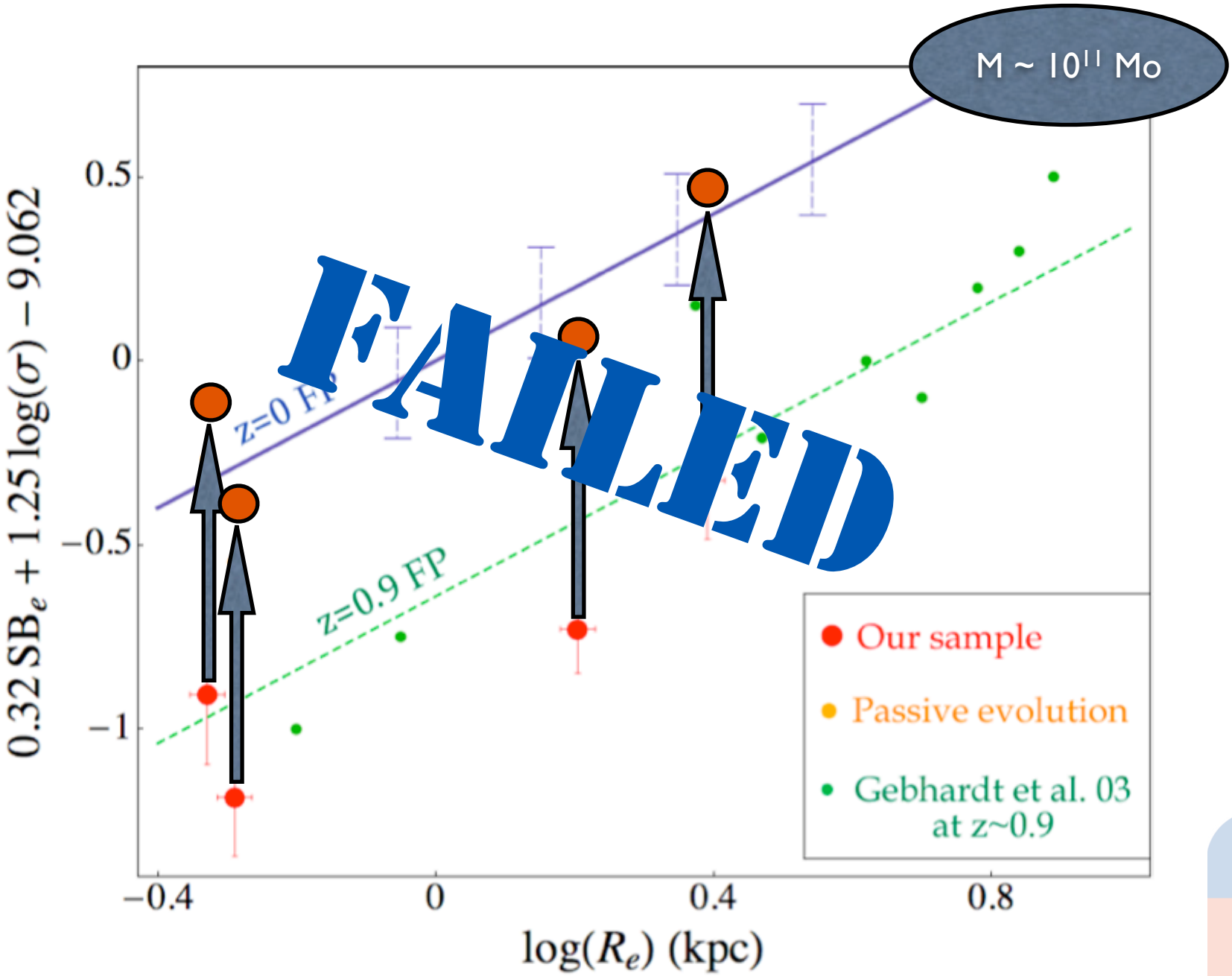
FP Evolution: fading



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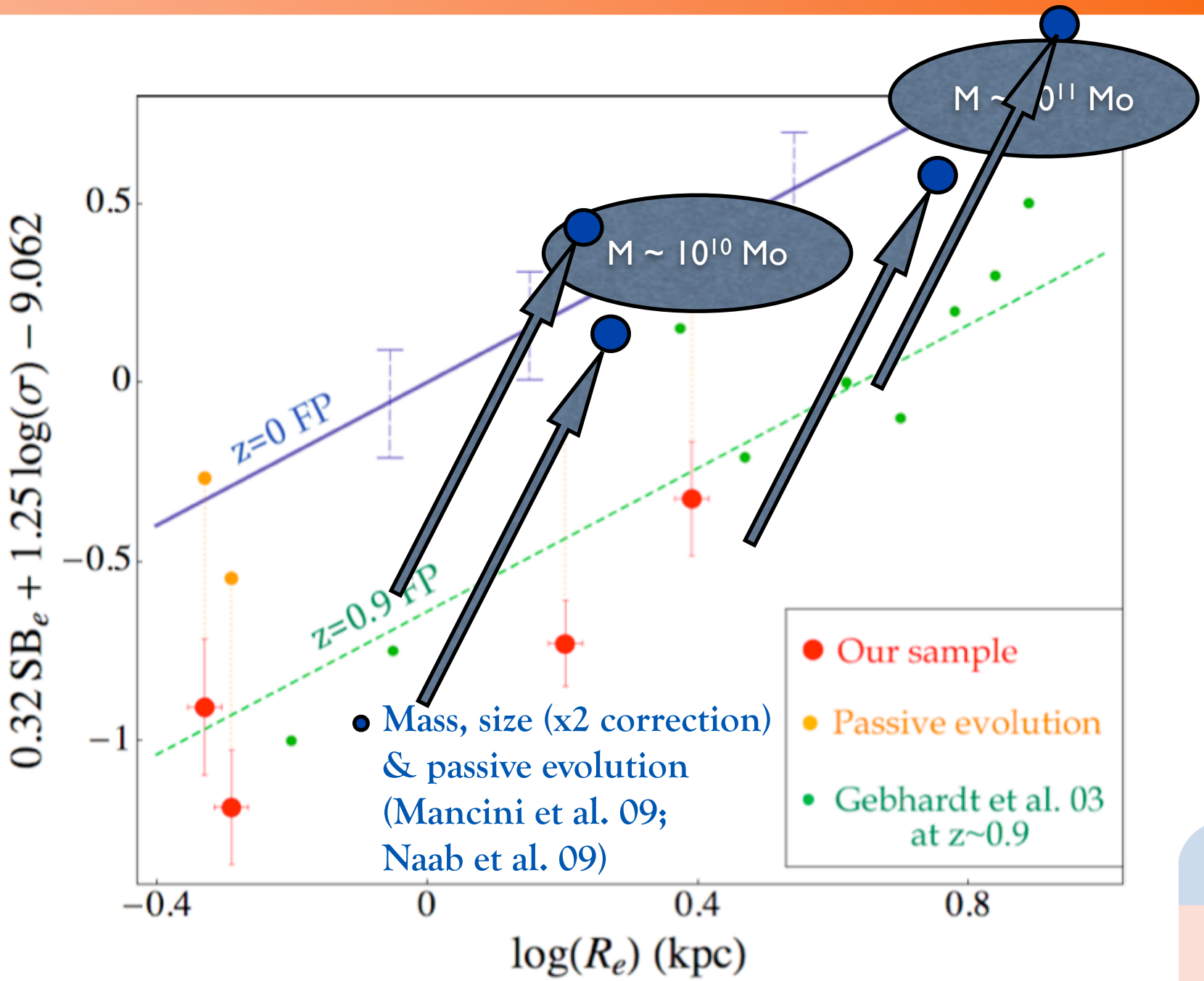
FP Evolution: mass, size & fading



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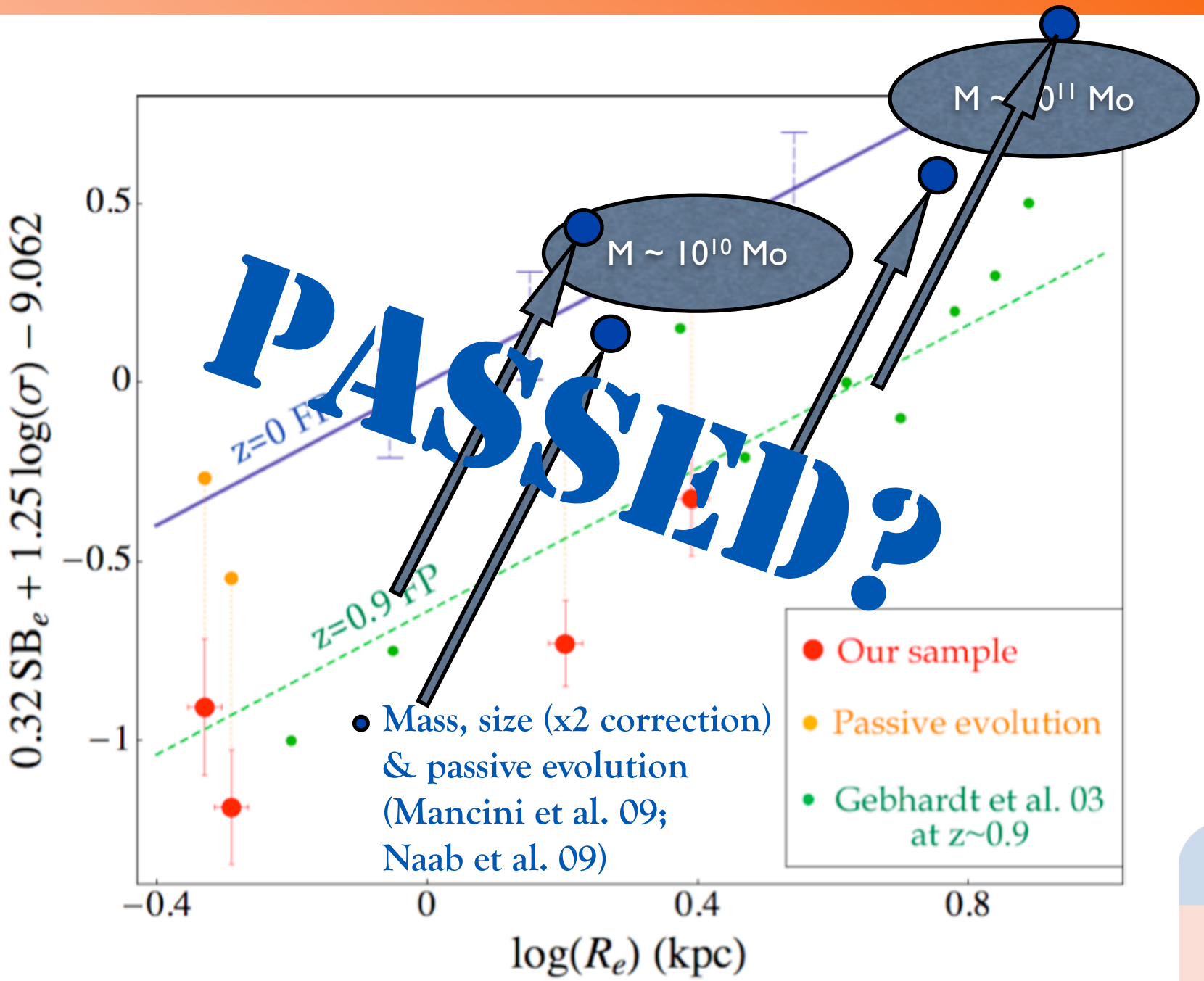
FP Evolution: mass, size & fading



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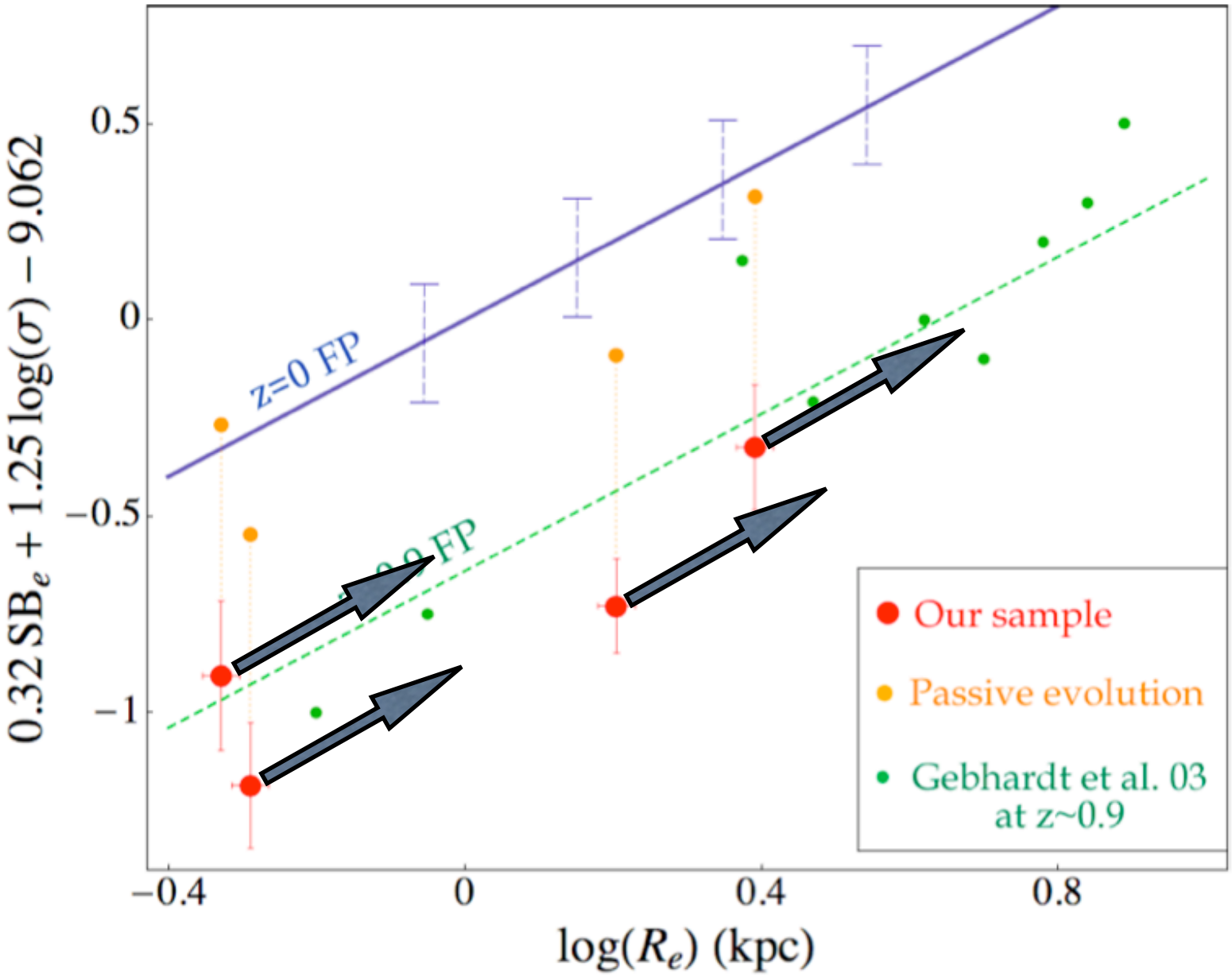
FP Evolution: mass & size



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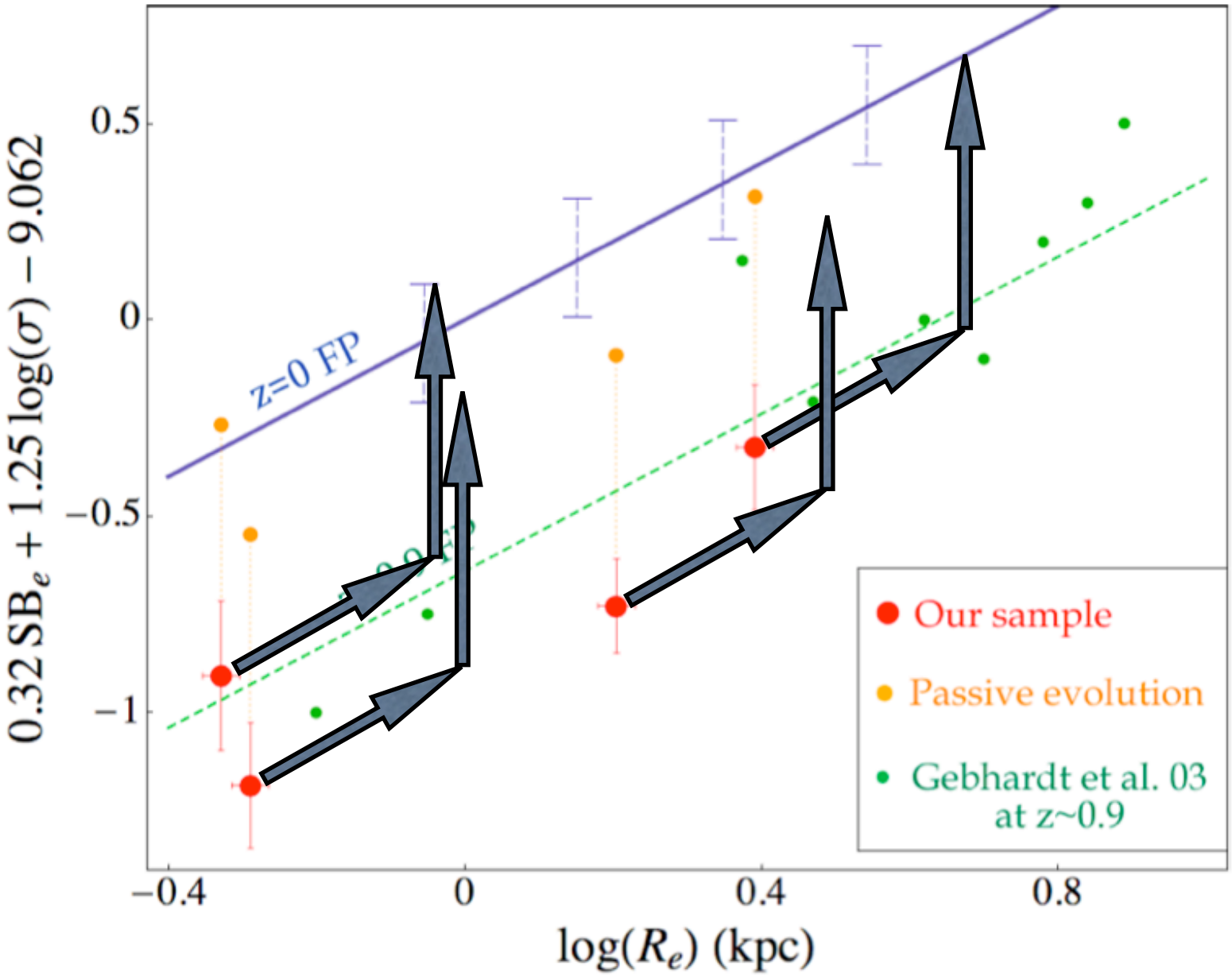
FP Evolution: mass, size & fading



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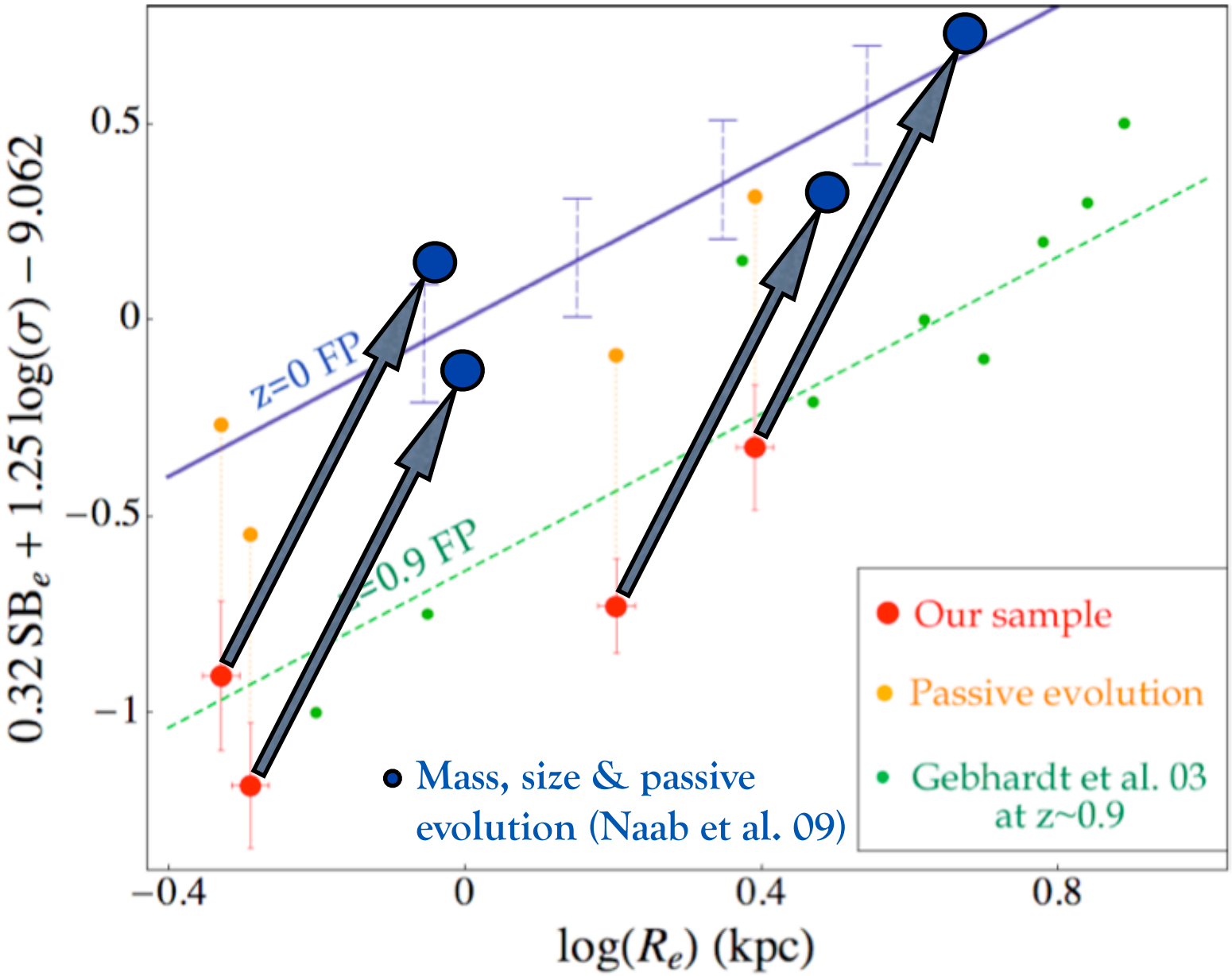
FP Evolution: mass, size & fading



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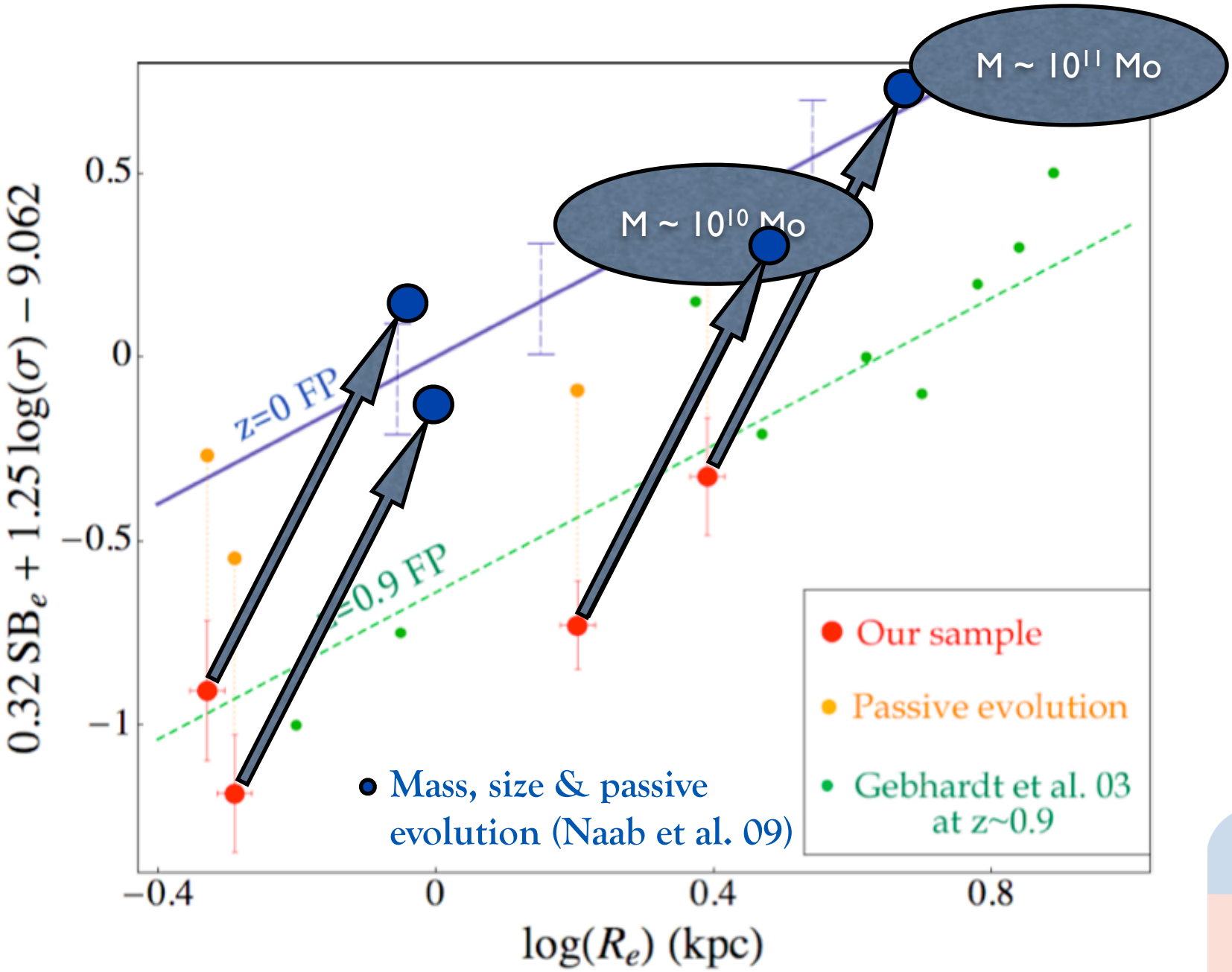
FP Evolution: mass, size & fading



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