Calibrating the galaxy cluster mass scale with cluster velocity dispersions

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Aim: estimate the *Planck* cluster mass bias using dynamical mass measurements based on velocity dispersions

$$M_{Planck} = (1-b)\, M$$

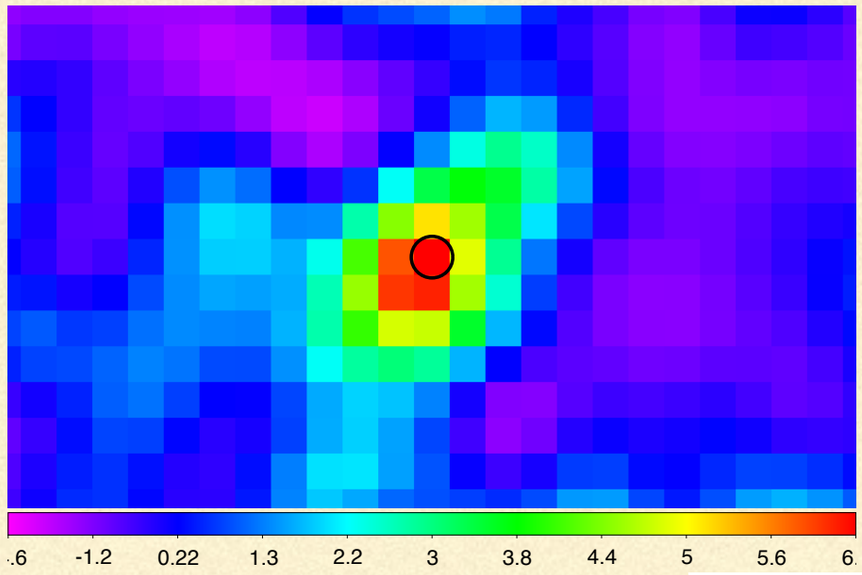
Spectroscopic Study of 20 *Planck* galaxy clusters

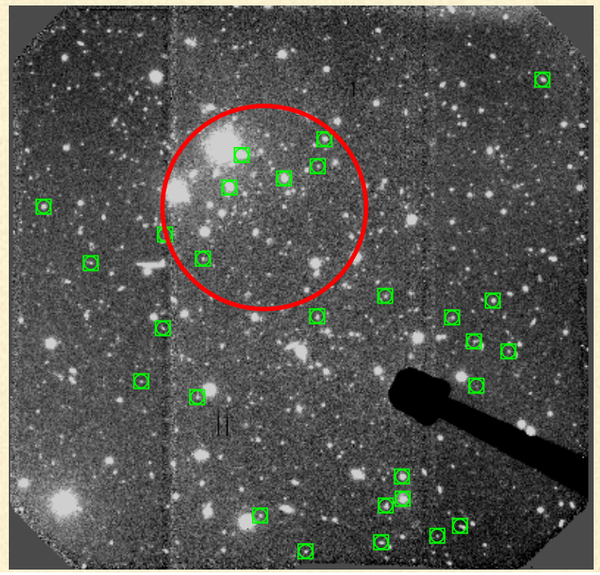
ex: PSZ2 G250.04+24.14

- mass range:

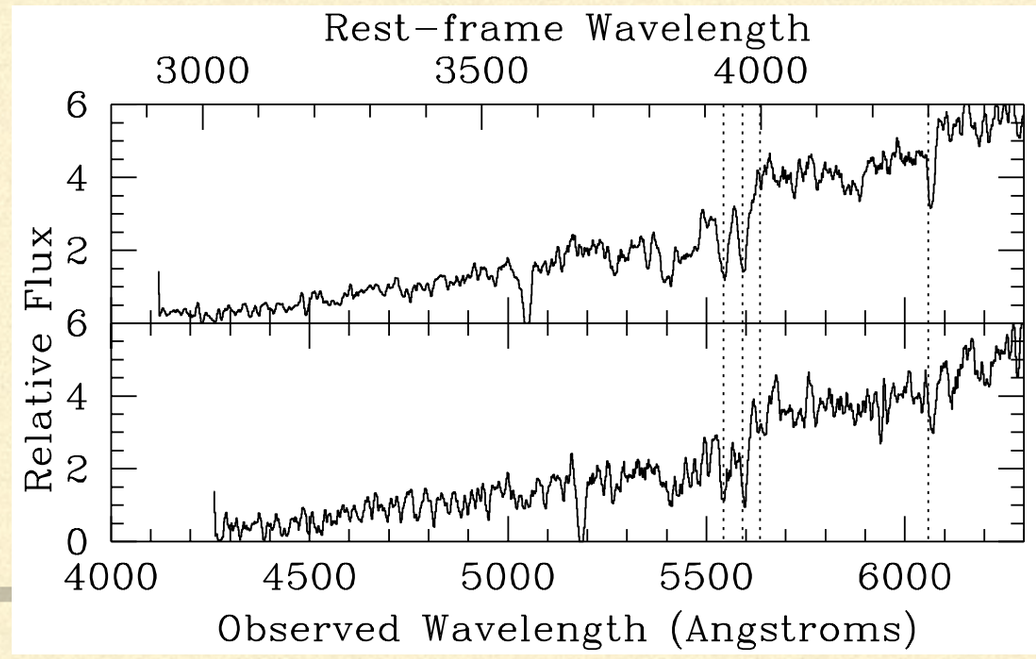
$$2 \times 10^{14} M_\odot \lesssim M_{500}^{\rm Pl} \lesssim 10^{15} M_\odot$$

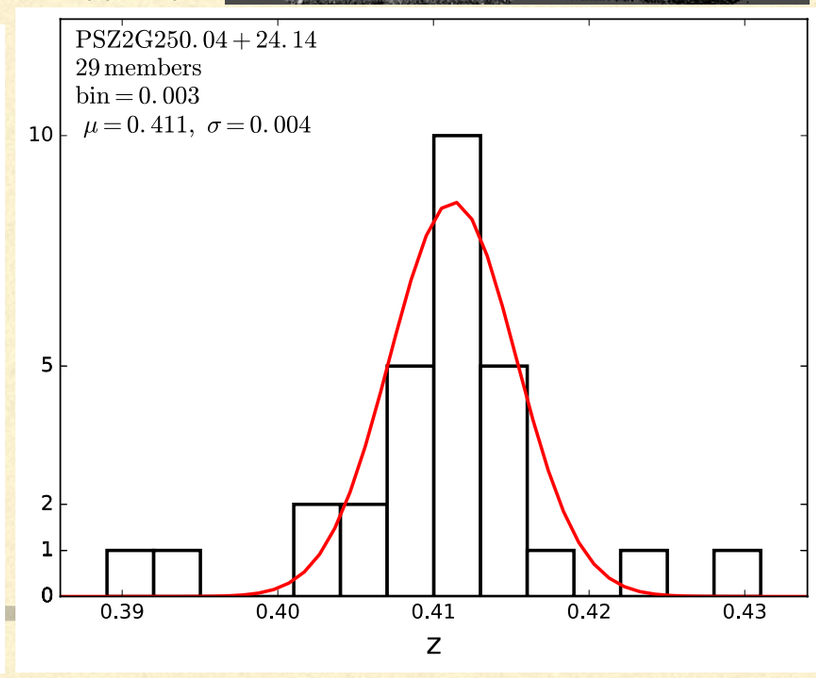
- $10 < N_{gal} < 40$
- $0.25 < z < 0.45$



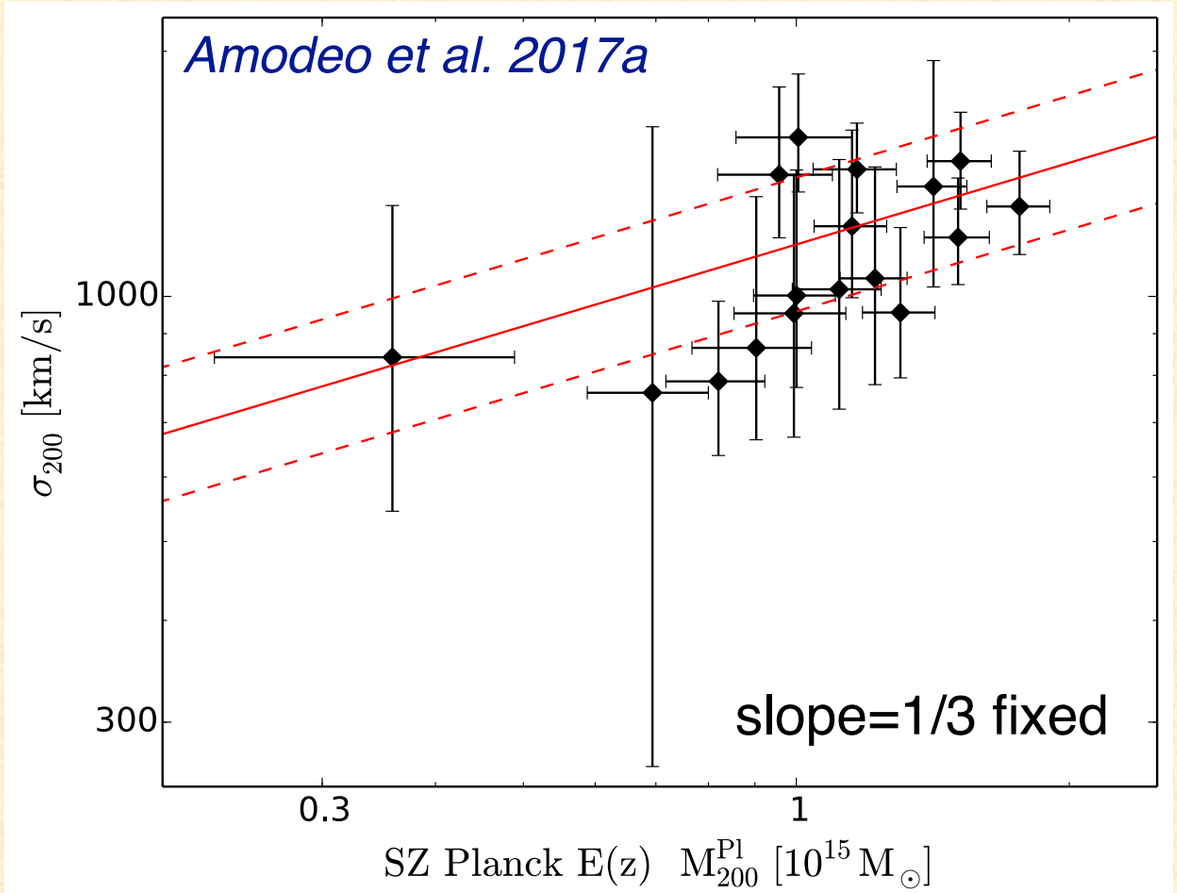


Gemini-GMOS optical spectroscopy





Amodeo et al. 2017b, in prep.



The *"observed"* *velocity dispersion-mass* relation

$$\sigma_{1D} = A \left[\frac{h(z)\ M_{200}^{Pl}}{10^{15} M_\odot} \right]^{1/3}$$

Cluster model for the mass bias estimator

simulations

Eddington bias

correlated scatter

velocity bias

$$(1-b) = \left(\frac{A_g}{A}\right)^3 f_{EB} f_{corr} = \left(\frac{A_d}{A}\right)^3 b_v^3 f_{EB} f_{corr}$$

$$b_v \equiv \frac{A_g}{A_d}$$

g*alaxies may have a different velocity dispersion than their* ***d****ark matter host!*

fit to data

$$(1-b) = (0.51 \pm 0.09) b_v^3$$