Rotational kSZ effect

in groups and clusters from the MACSIS & BAHAMAS simulations

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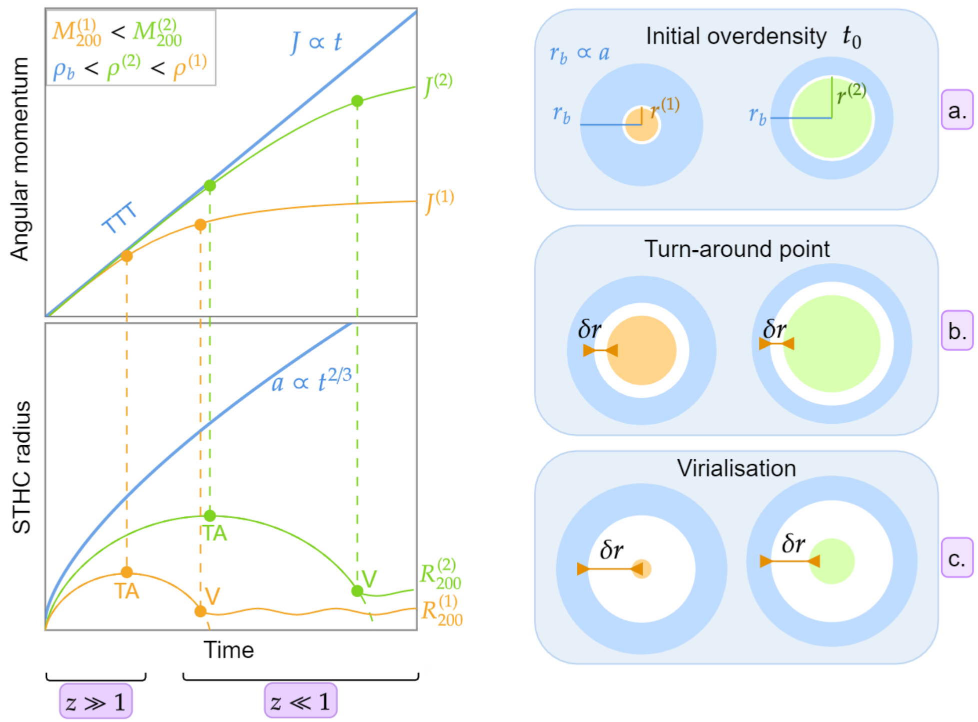
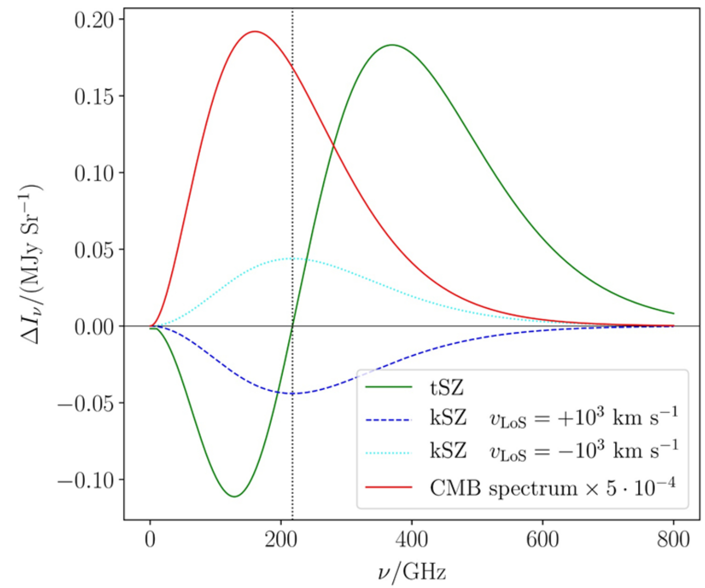
$$y_{\rm ksz} \equiv \int_{\rm LoS} \sigma_{\rm T} n_{\rm e} \underbrace{\boldsymbol{n}\cdot\boldsymbol{\beta}_{\rm p}}_{\text{Radial velocity field}} {\rm d}l$$

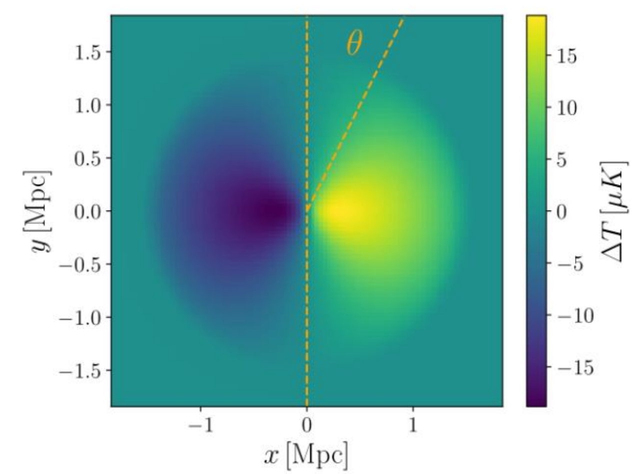
See Porciani+02

HOW DOES ANGULAR MOMENTUM ORIGINATE IN THE UNIVERSE?





Baxter+19



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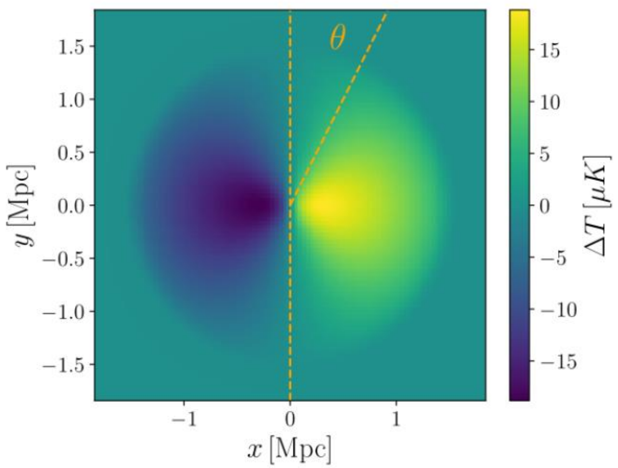
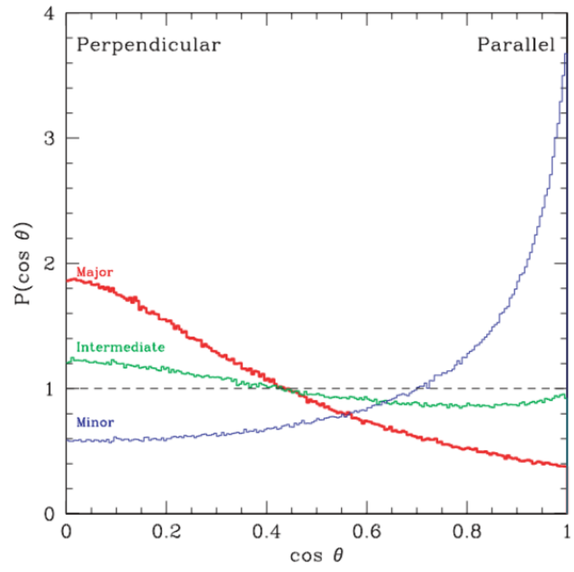
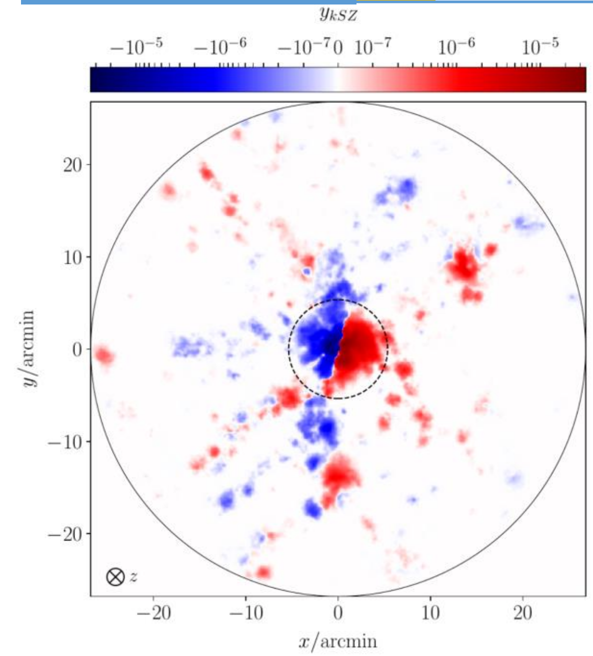


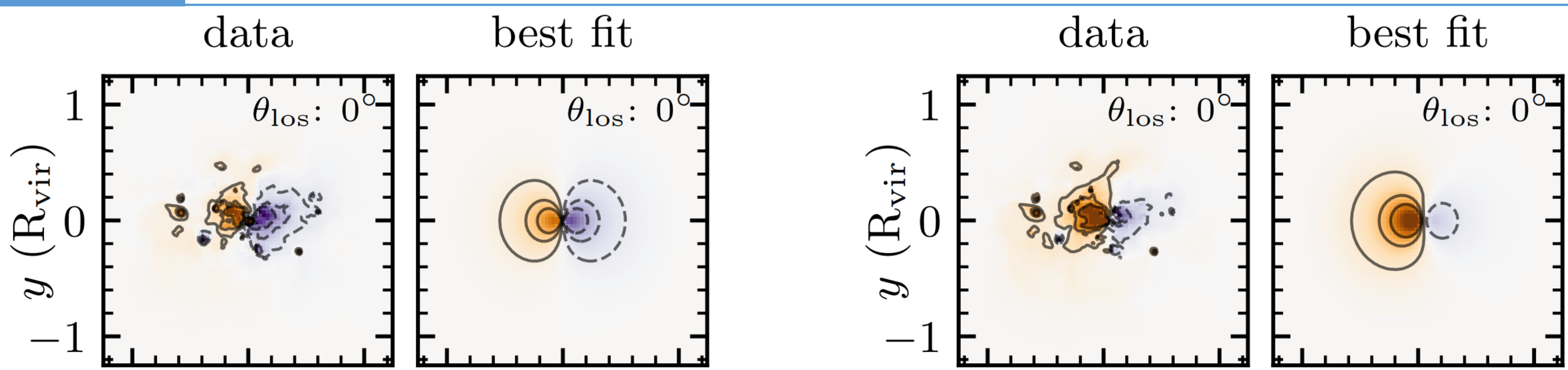
Bett+07



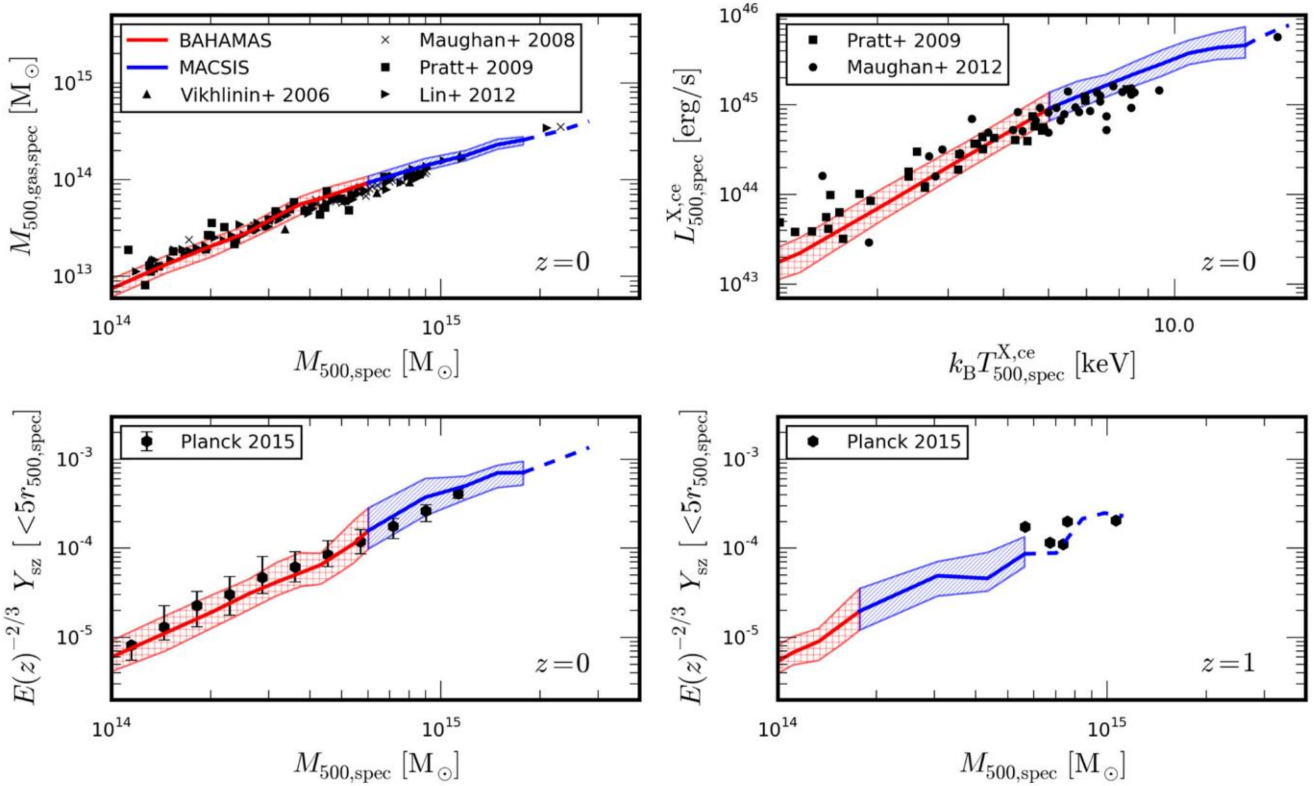
Altamura+19 P



Baldi+18



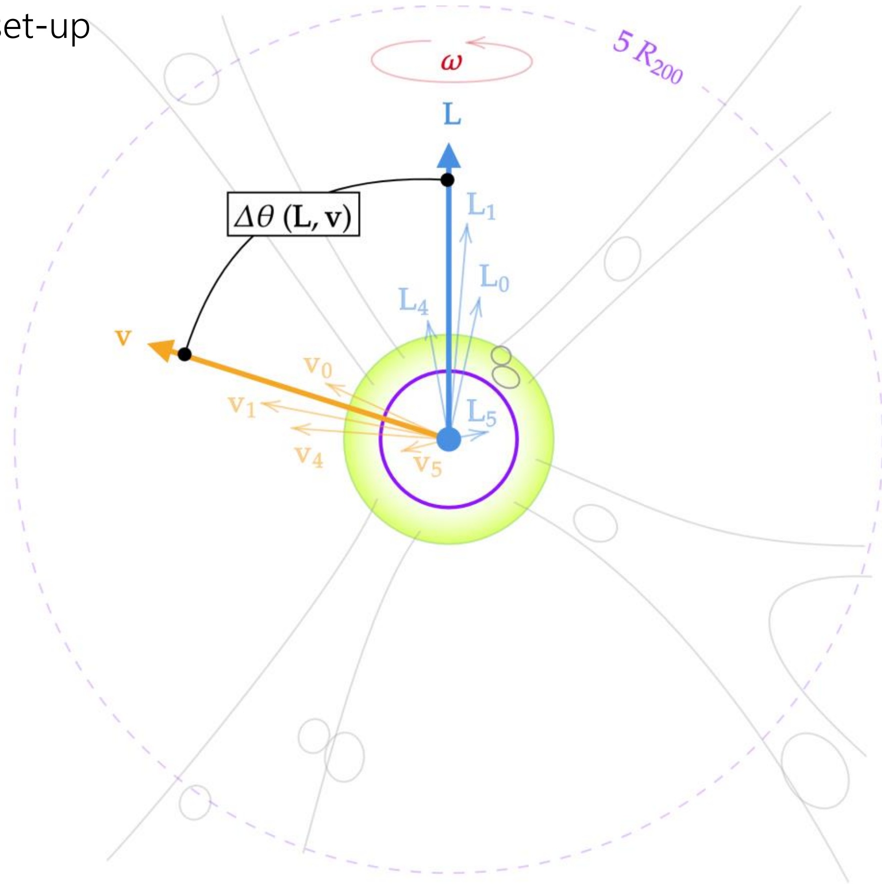
McCarthy+17 / Barnes+17

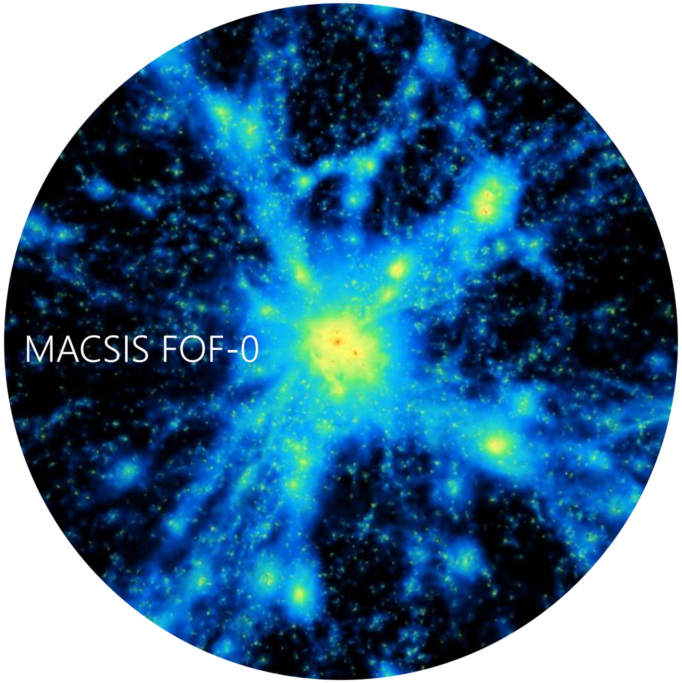


BAHAMAS: 400 h^{-1} Mpc volume → large statistics (20k objects)

MACSIS: 390 zooms from a 3.2 Gpc volume → high-mass clusters

Geometry set-up





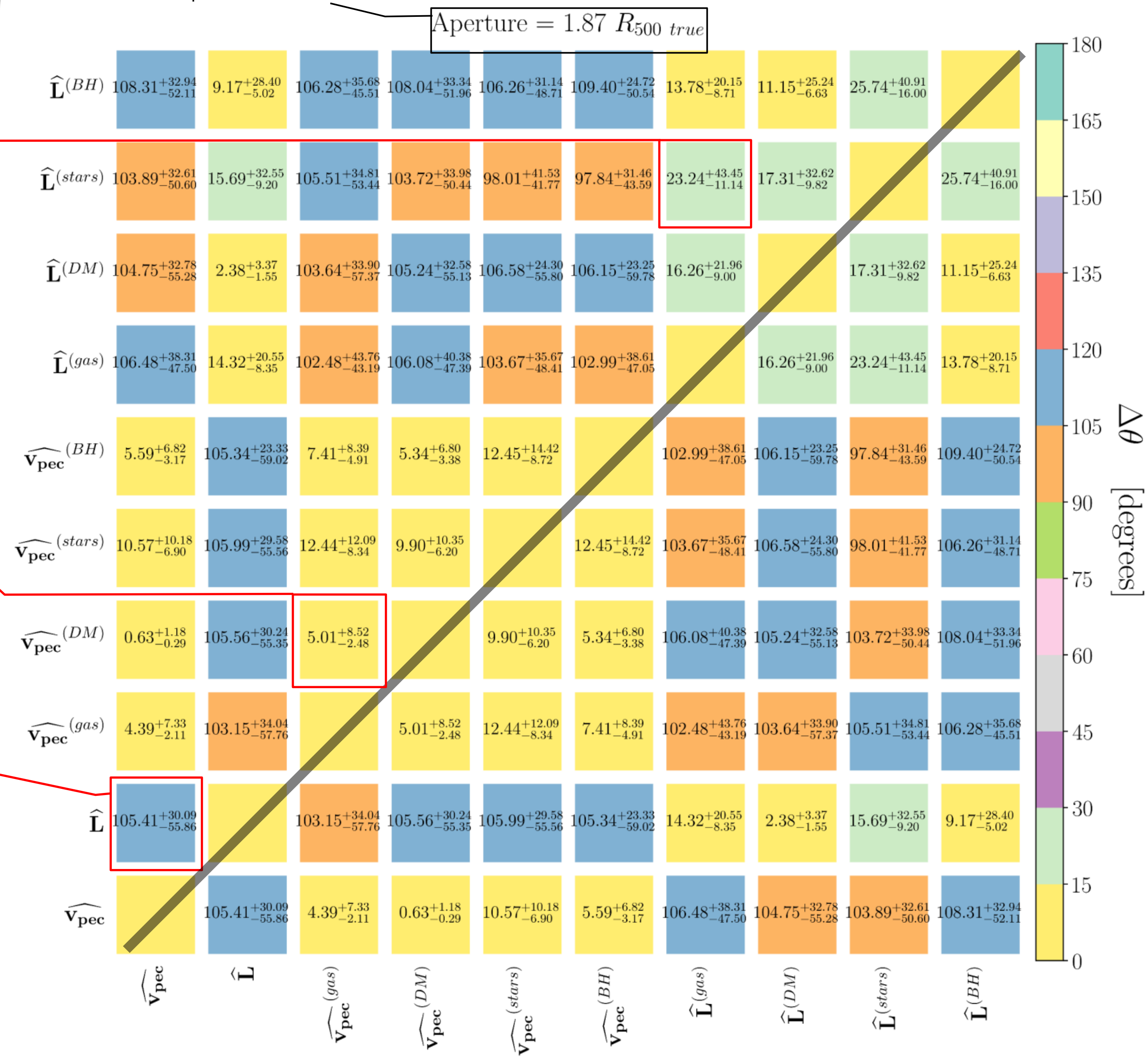
- Check angular momenta alignment L_i, L_j $(i \neq j)$
- Check angular momenta – bulk velocity alignment v_i, L_j
- Check bulk velocity alignment v_i, v_j $(i \neq j)$

Aperture 10 at z = 0

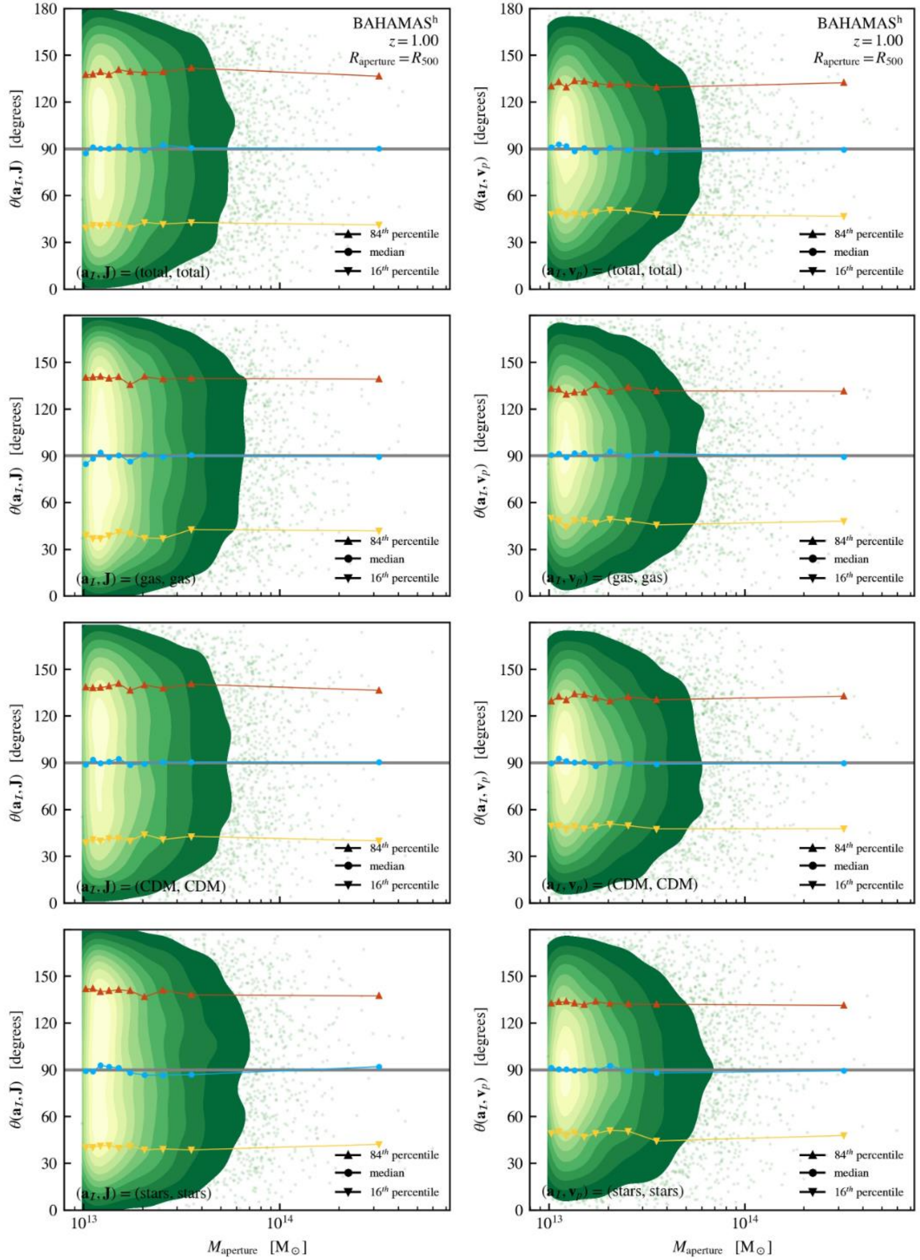
$\Delta\theta\ (L_{stars}, L_{gas})$

If this is 180 deg, then it's a bullet cluster

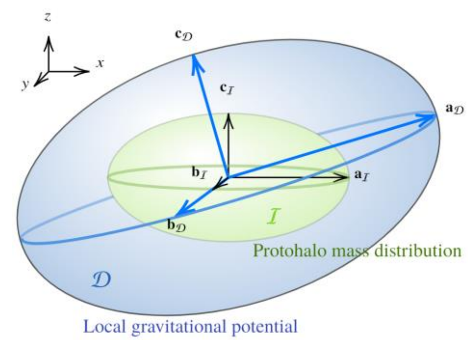
$\Delta\theta\ (L, v)$



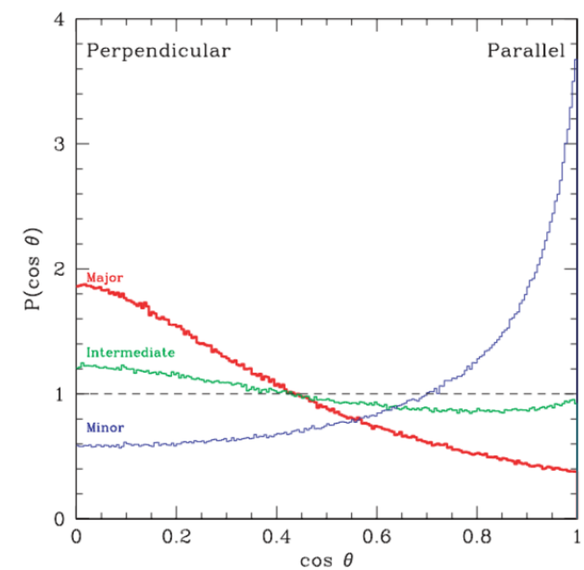
AIMS - PT. 1



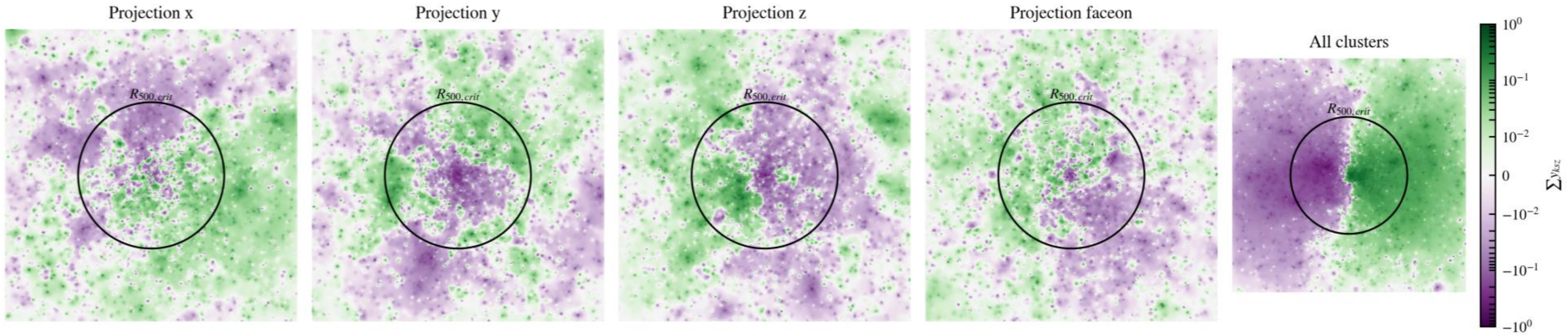
ASIDE: what about morphology?



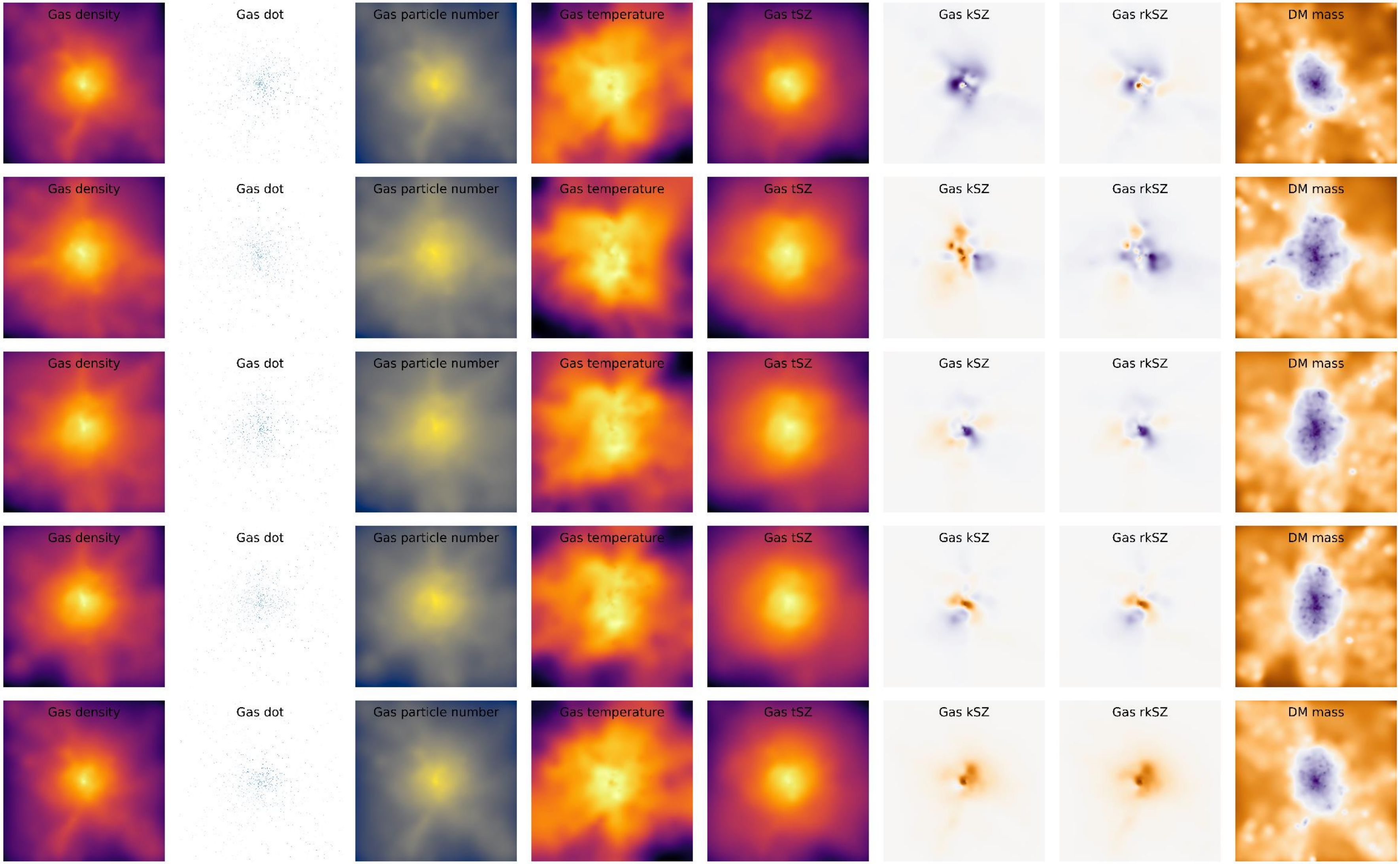
Bett+07



- Stacking kSZ maps after de-rotation



- Mass and redshift dependence
- Halo model fit (beta / gNFW)
- Sample selection++


Gas density
Gas dot
Gas particle number
Gas temperature
Gas tSZ
Gas kSZ
Gas rkSZ
DM mass
Gas density
Gas dot
Gas particle number
Gas temperature
Gas tSZ
Gas kSZ
Gas rkSZ
DM mass
Gas density
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Thanks for listening!

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