# THE SAMI CLUSTER KINEMATIC MORPHOLOGY - DENSITY RELATION
# OR:
# WHERE DO GALAXIES LOSE THEIR MOJO*?

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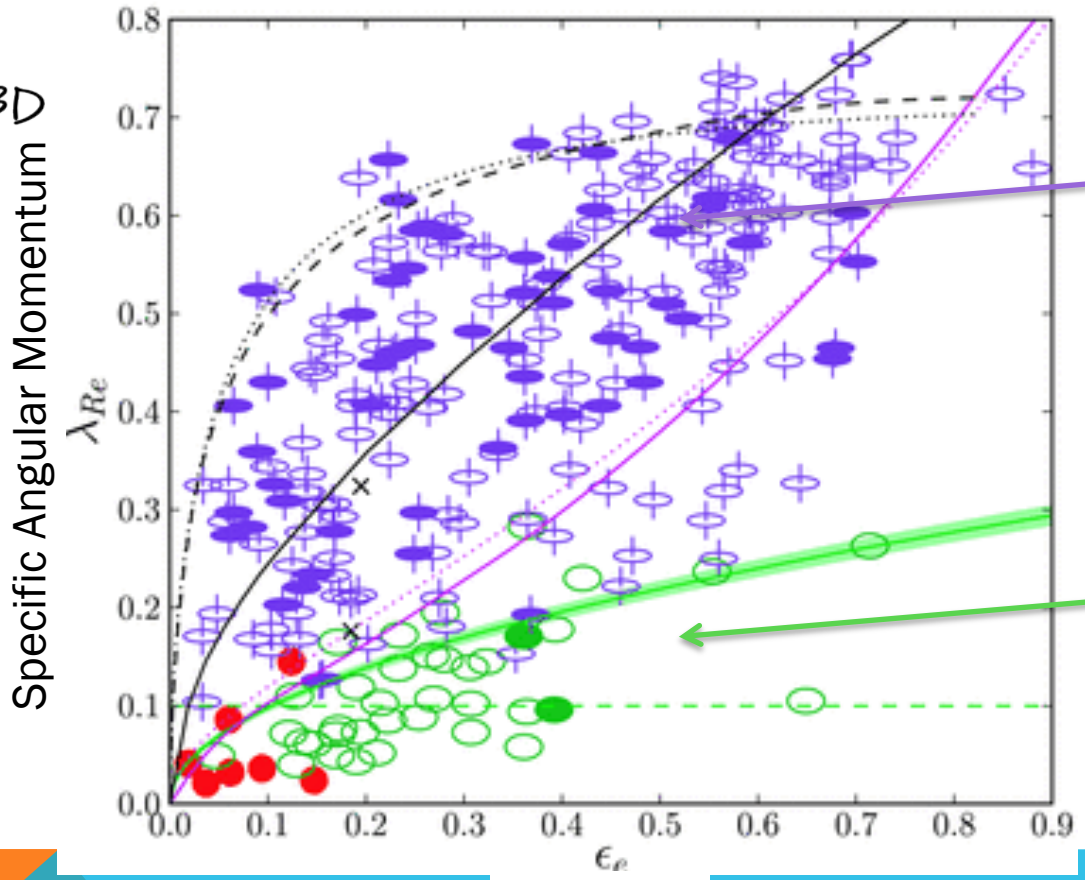
*BY MOJO I MEAN ROTATION...

# ATLAS$^{3D}$ – GALAXY ROTATION




KINEMATIC MORPHOLOGY

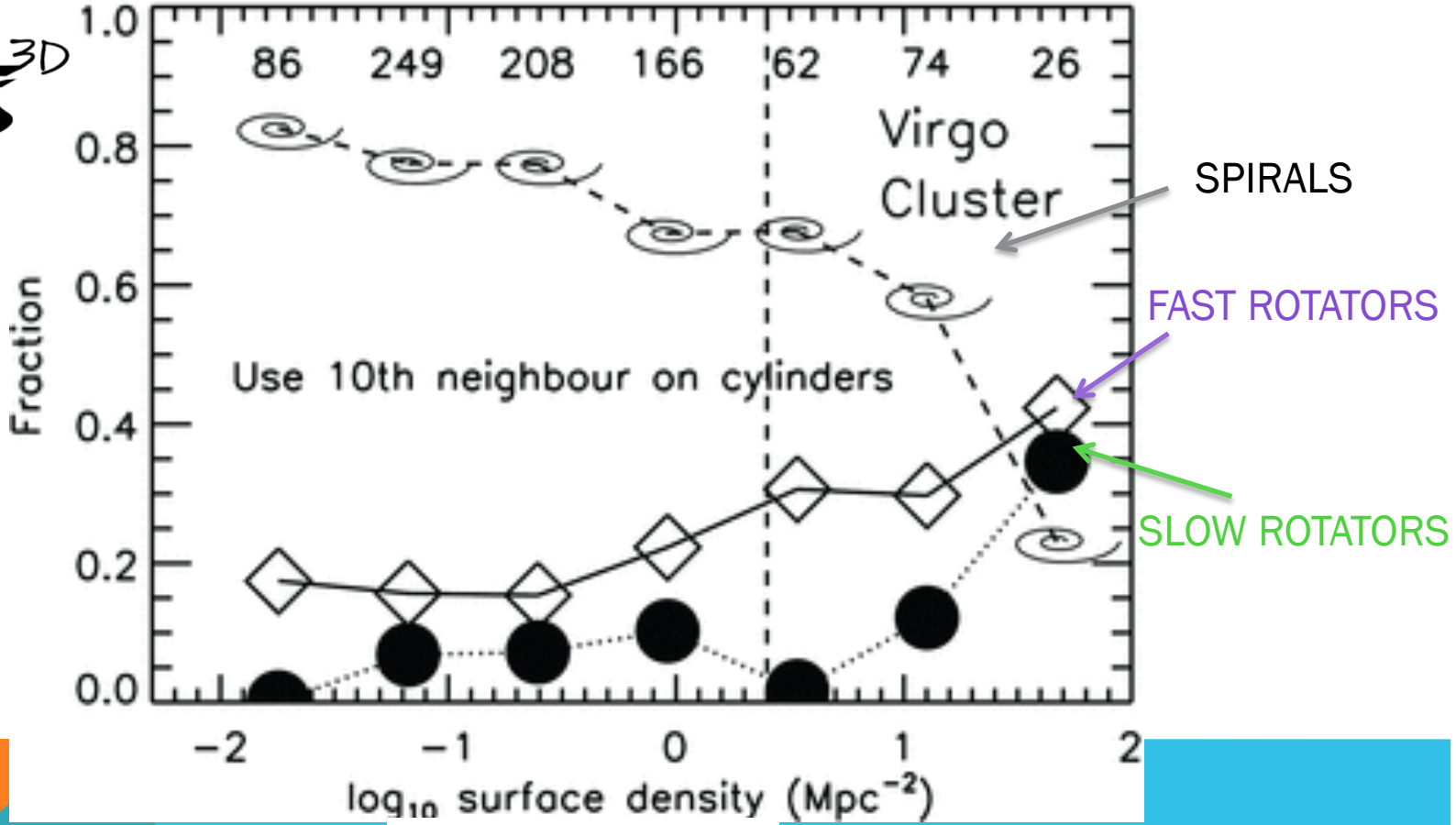
FAST ROTATORS

SLOW ROTATORS

Emsellem+(2011)

Ellipticity

# ATLAS$^{3D}$ – KINEMATIC MORPHOLOGY DENSITY RELATION

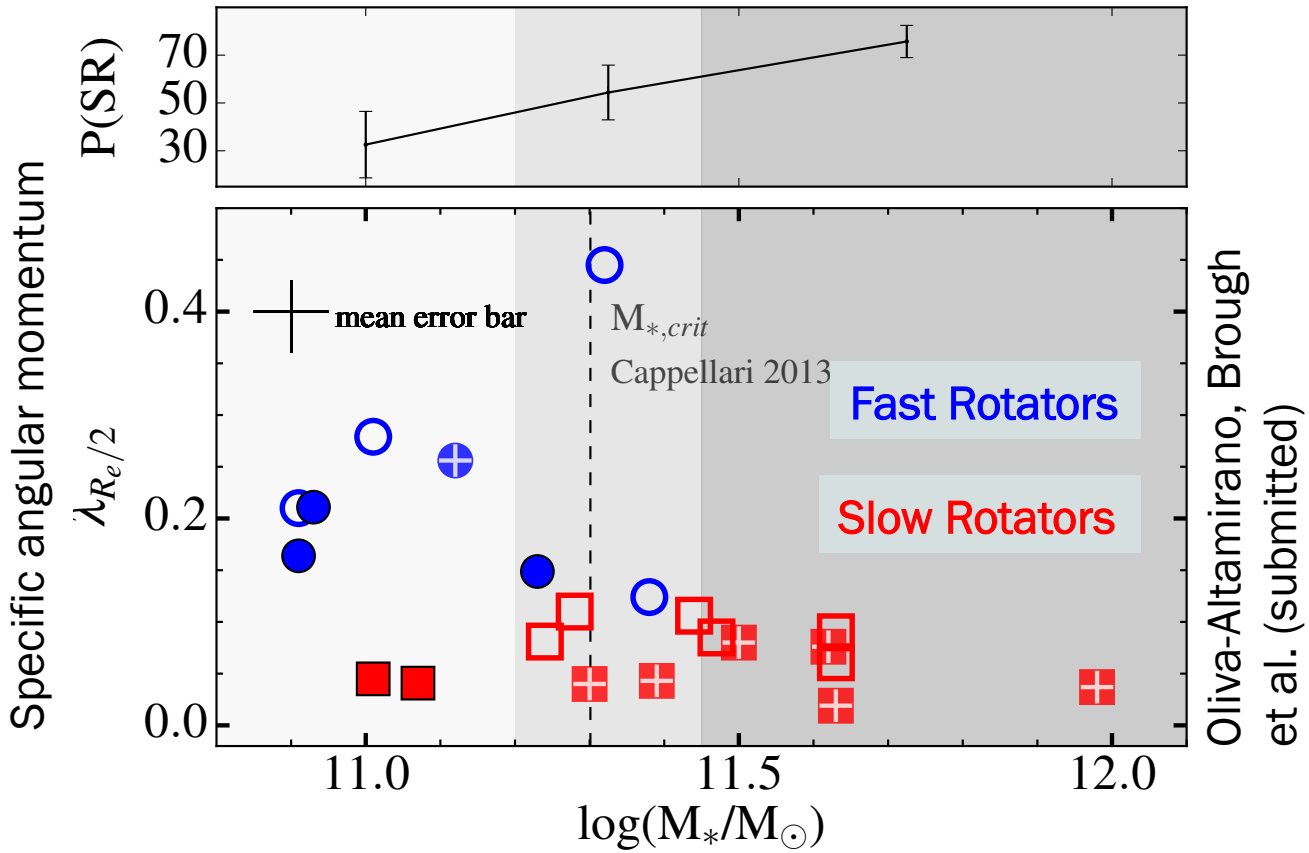



Cappellari+(2011)

Density of Galaxies

- Slow rotators nearly absent at lowest density environments
- Increase in slow rotators in Virgo suggests a different mechanism is at work in clusters.
- BUT, only ~60 early-type galaxies in 1 cluster environment.
- Since then:
  - D'Eugenio+2013: 30 galaxies in A1689
  - Houghton+2013: 27 galaxies in Coma (+ A1689 + Virgo)
  - Scott+2014: 10 galaxies in Fornax
  - Fogarty+2014: 79 galaxies in 3 SAMI pilot clusters

# BUT, ROTATION DEPENDS ON MASS...!




- Compilation sample of 22 central galaxies
- All above Log $M_*/M_\odot$=11.5 are slow rotators
- Also seen by Jimmy+(2013); Cappellari (2013) and MASSIVE survey (Veale+2016)

# SAMI GALAXY SURVEY - CLUSTERS

- SAMI galaxy survey has targeted 8 galaxy clusters (Bryant +2015).

- SAMI clusters range from $0.2 < M_{200}(10^{15}M_{\odot}) < 1.7$ in mass and $0.02 < z < 0.06$ (Owers+in prep).

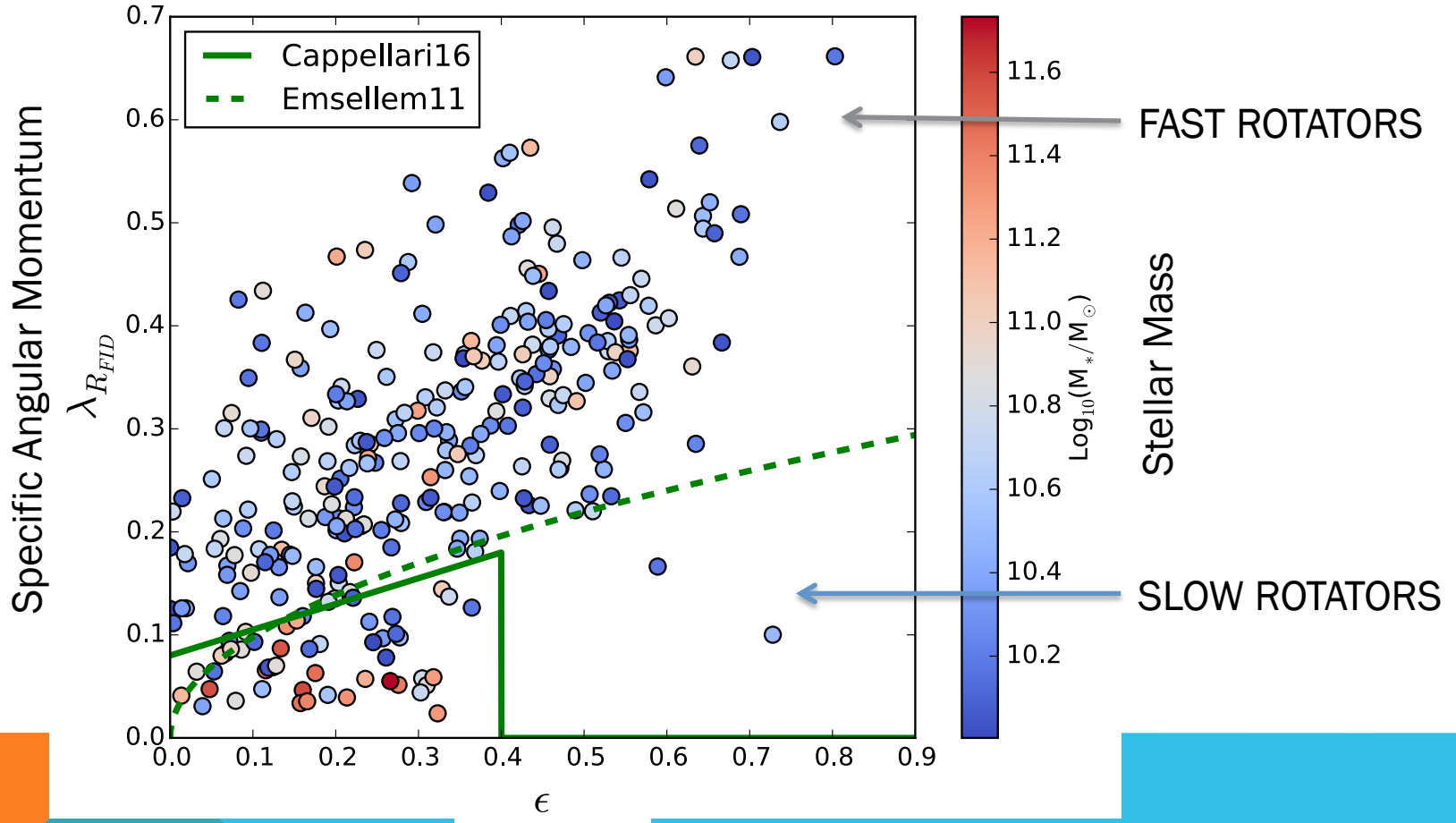
- SAMI targets cluster members with $\log M_{\star} > 9.5 M_{\odot}$ ($z<0.045$) and $\log M_{*} > 10.0 M_{\odot}$ ($z>0.045$) within $1 r_{200}$ and $\pm 3.5 V_{cl}/\sigma_{cl}$.

- There are 839 cluster members meeting these criteria. Of these 475 have been observed already.

# SAMI DATA PRODUCTS

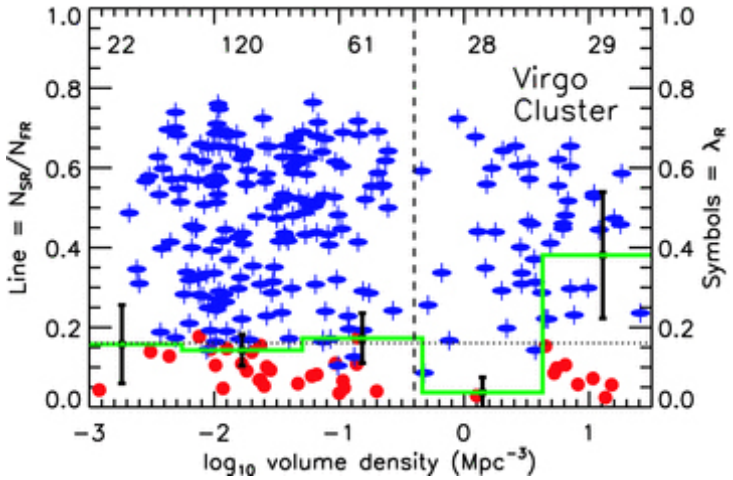
- Stellar kinematics measured using pPXF (van de Sande+in prep).
- Stellar mass measured using *g-i* colour relationship (Taylor+2012).
- Galaxy density measured using Nth nearest-neighbour surface density for volume-limited galaxies within velocity cylinder– $\Sigma_{N,V}$ (e.g. Brough+2013).
- Results here from early-type galaxies (*g-i* colour selected) with LogM*/$M_{\odot}$>10 (299 galaxies).

# SAMI – CLUSTER GALAXY ROTATION

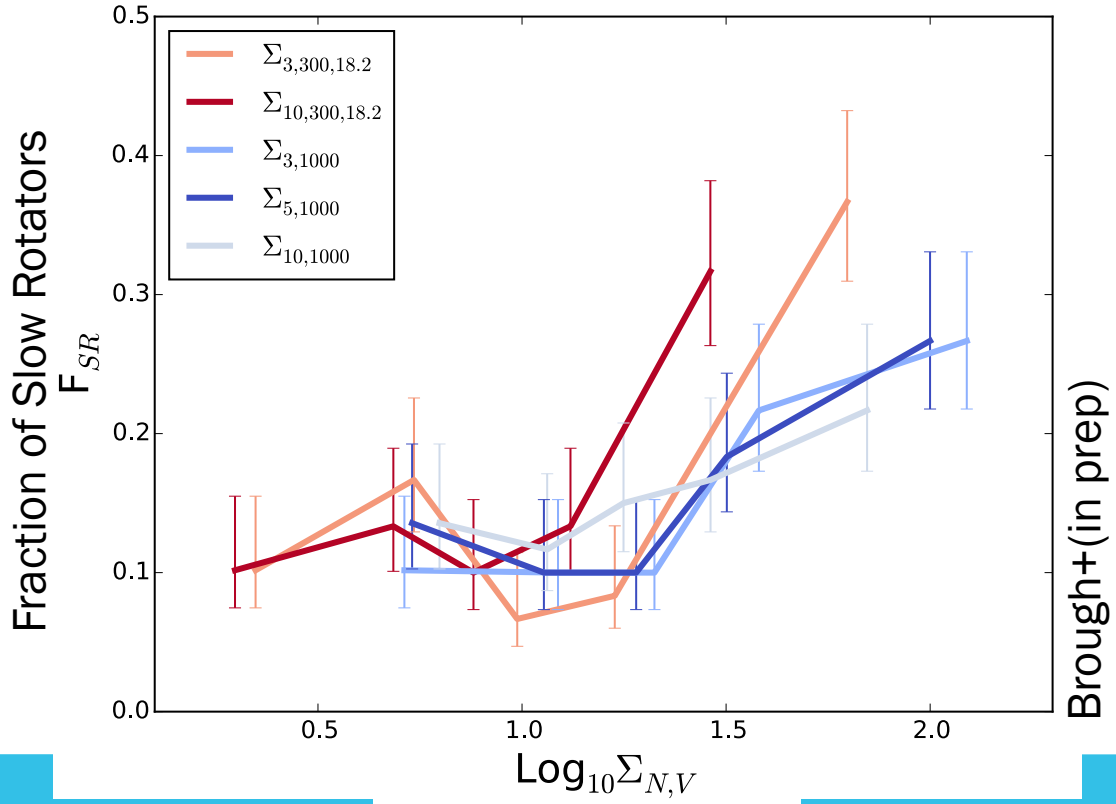



Brough+(in prep)

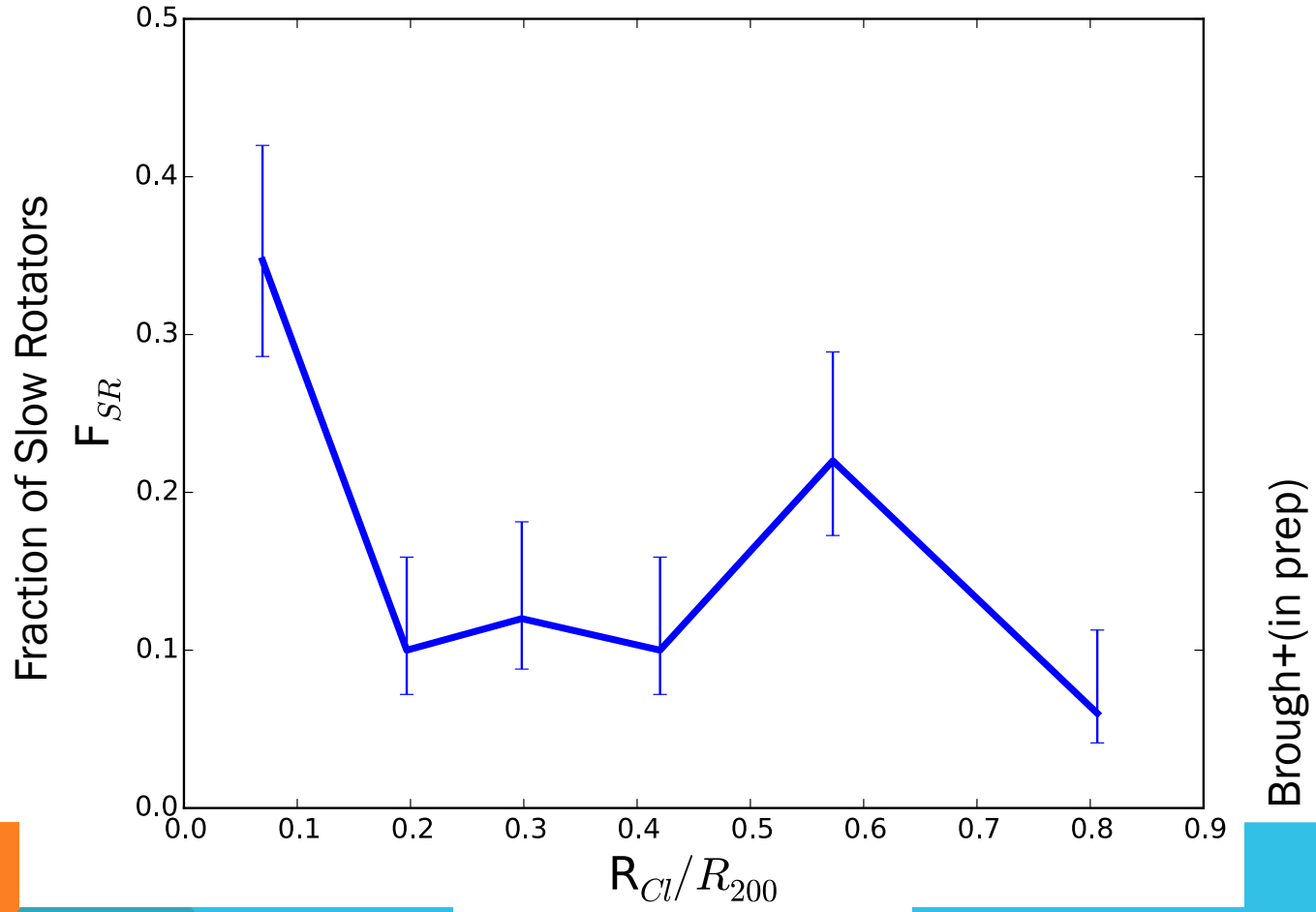
# SAMI – CLUSTER KINEMATIC MORPHOLOGY DENSITY RELATION



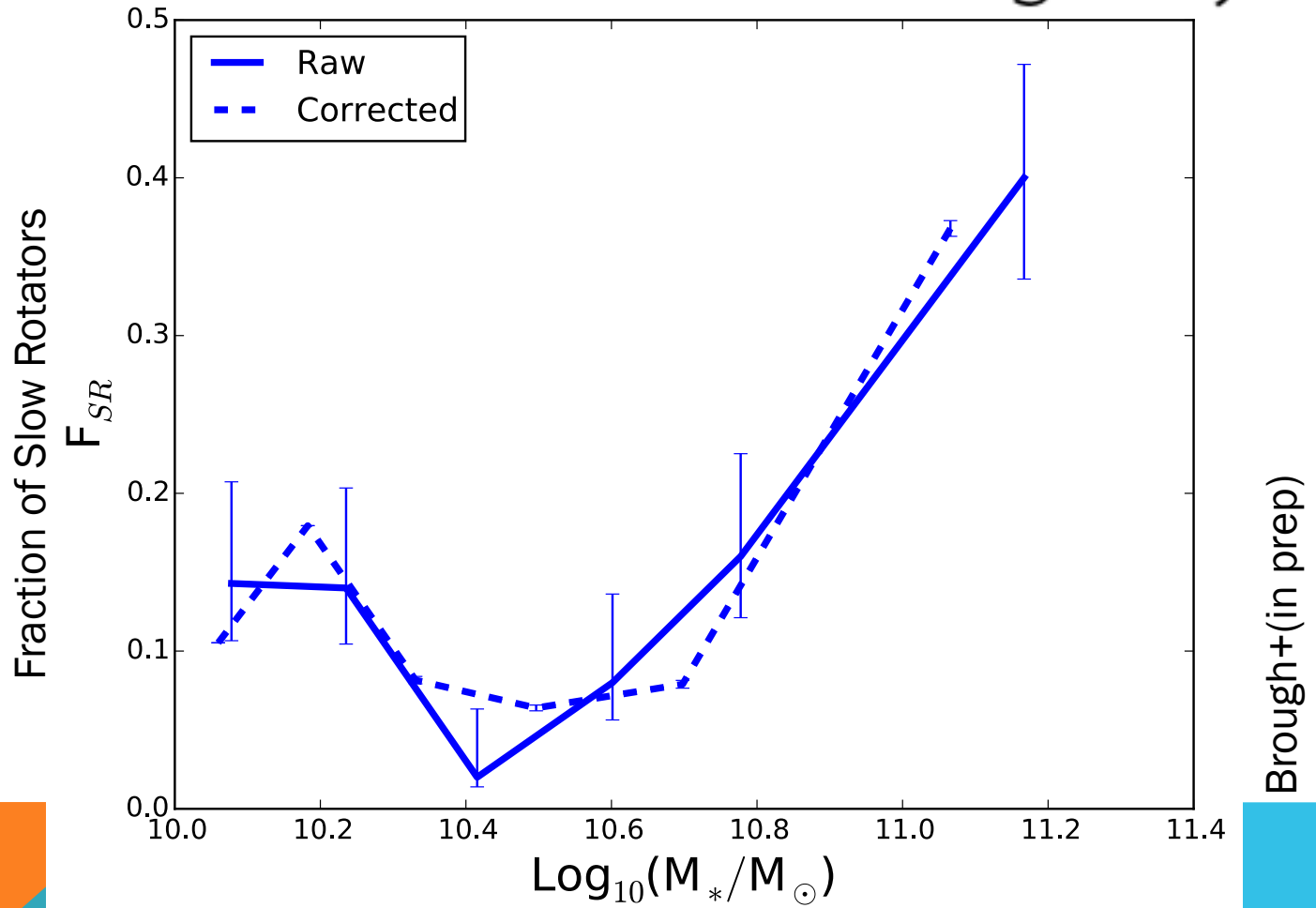

$F_{SR}=N_{SR} / (N_{FR}+N_{SR})$



# BUT ROTATION DEPENDS ON RADIUS

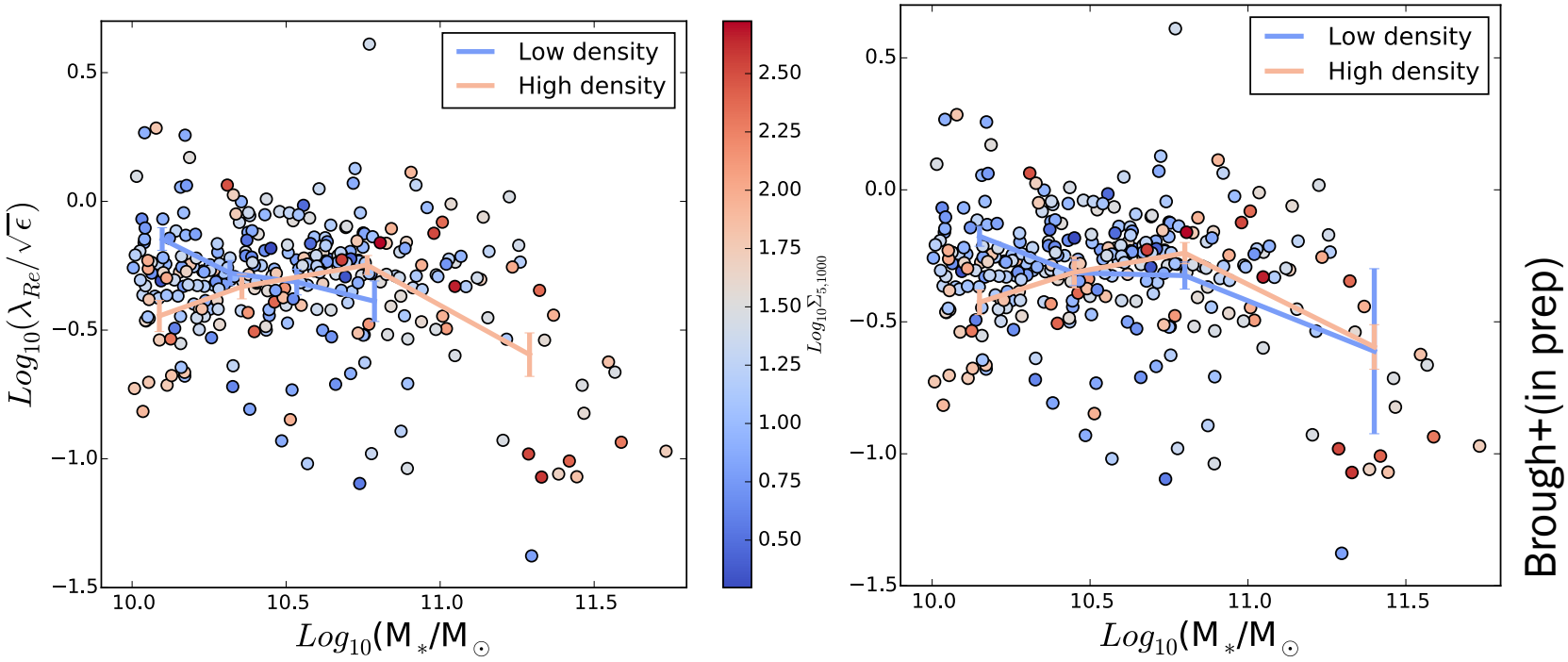


# AND ROTATION DEPENDS ON MASS



sami galaxy survey

Specific Angular Momentum (corrected for Ellipticity)




EQUAL NUMBERS OF GALAXIES/BIN

EQUAL MASS BINS

Brough+(in prep)

# SO…

- SAMI observes the same fractional increase of slow rotators with environment as previous studies.
- We see environmental relation in clusters is due to relationship with stellar mass *NOT* environment.
- We haven't found where galaxies lose their mojo (yet!)
- Questions still to be answered…:
  - Does this hold for central vs satellite galaxies of the clusters? (Brough+in prep2)
  - Does this hold in group mass halos? (van de Sande +in prep)