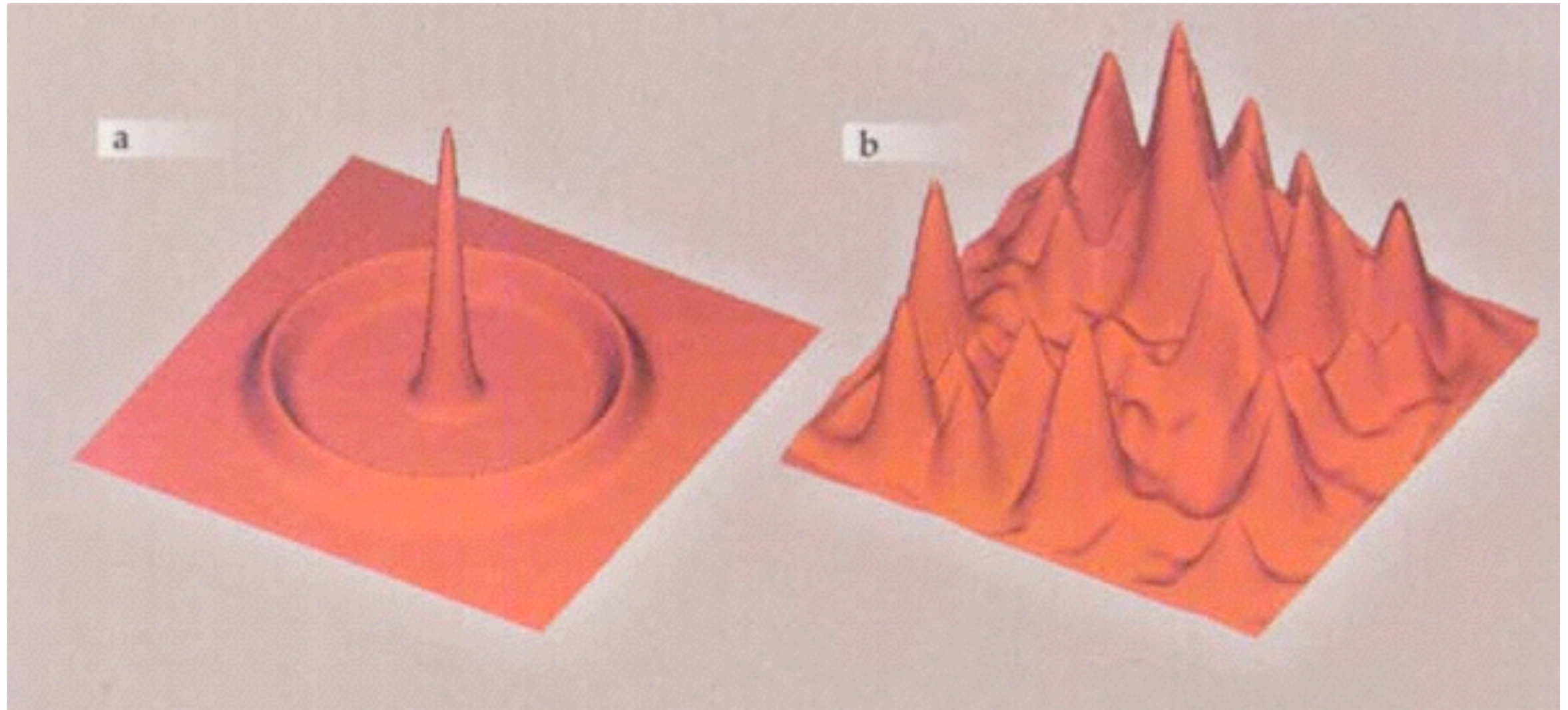


Understanding ~~Looking for~~ systematics in the 2PACF of galaxies[★]

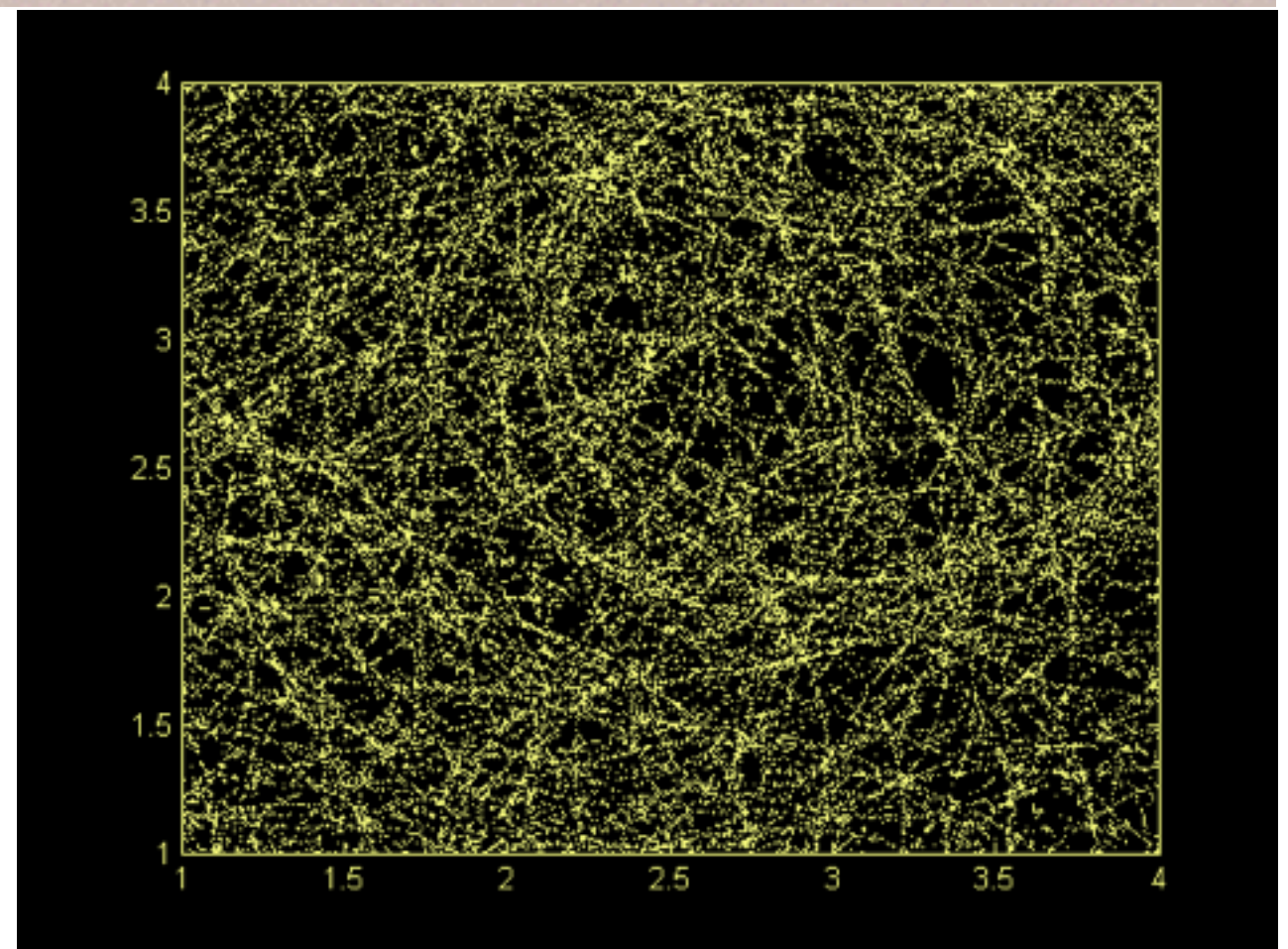
Armando Bernui



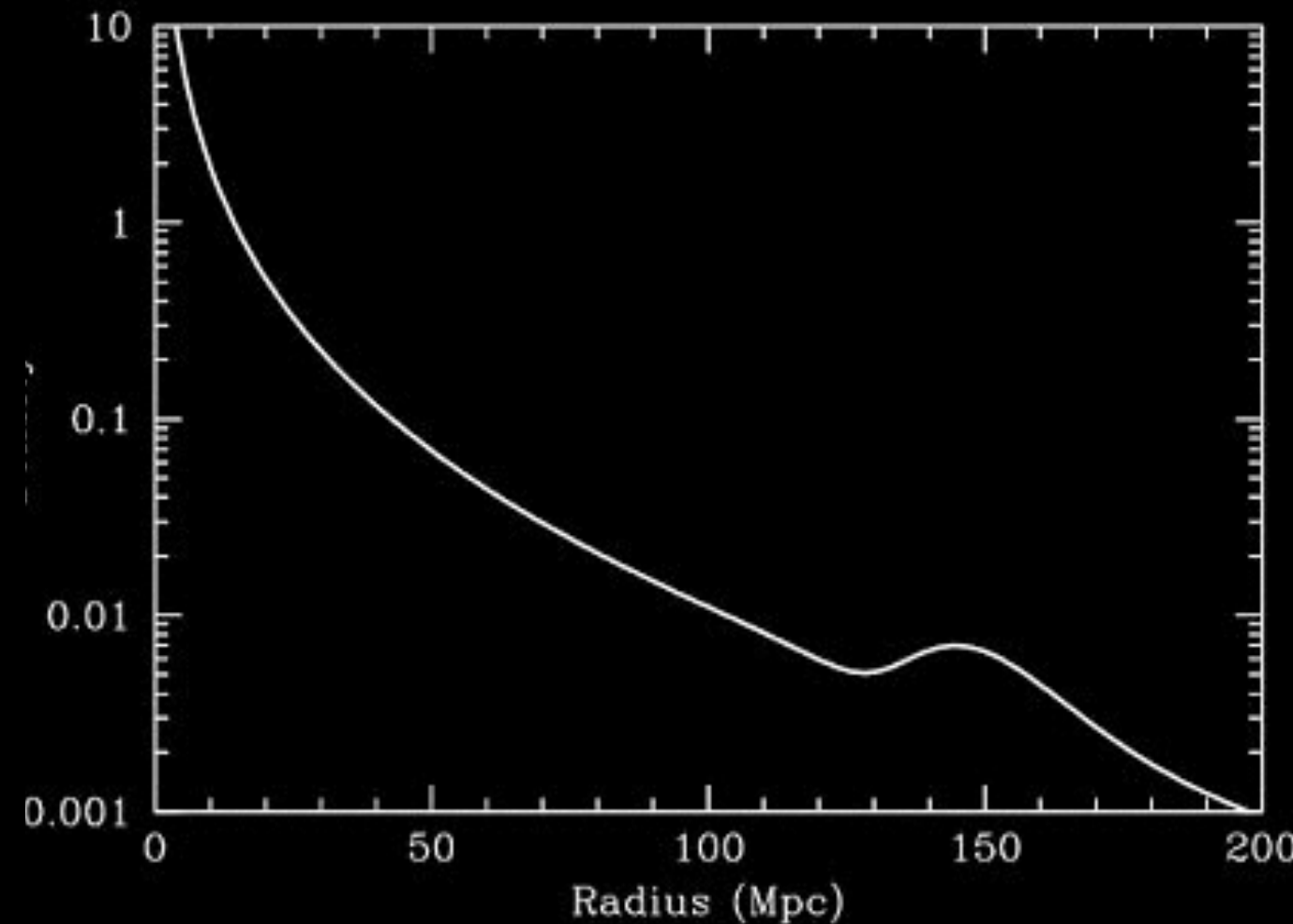
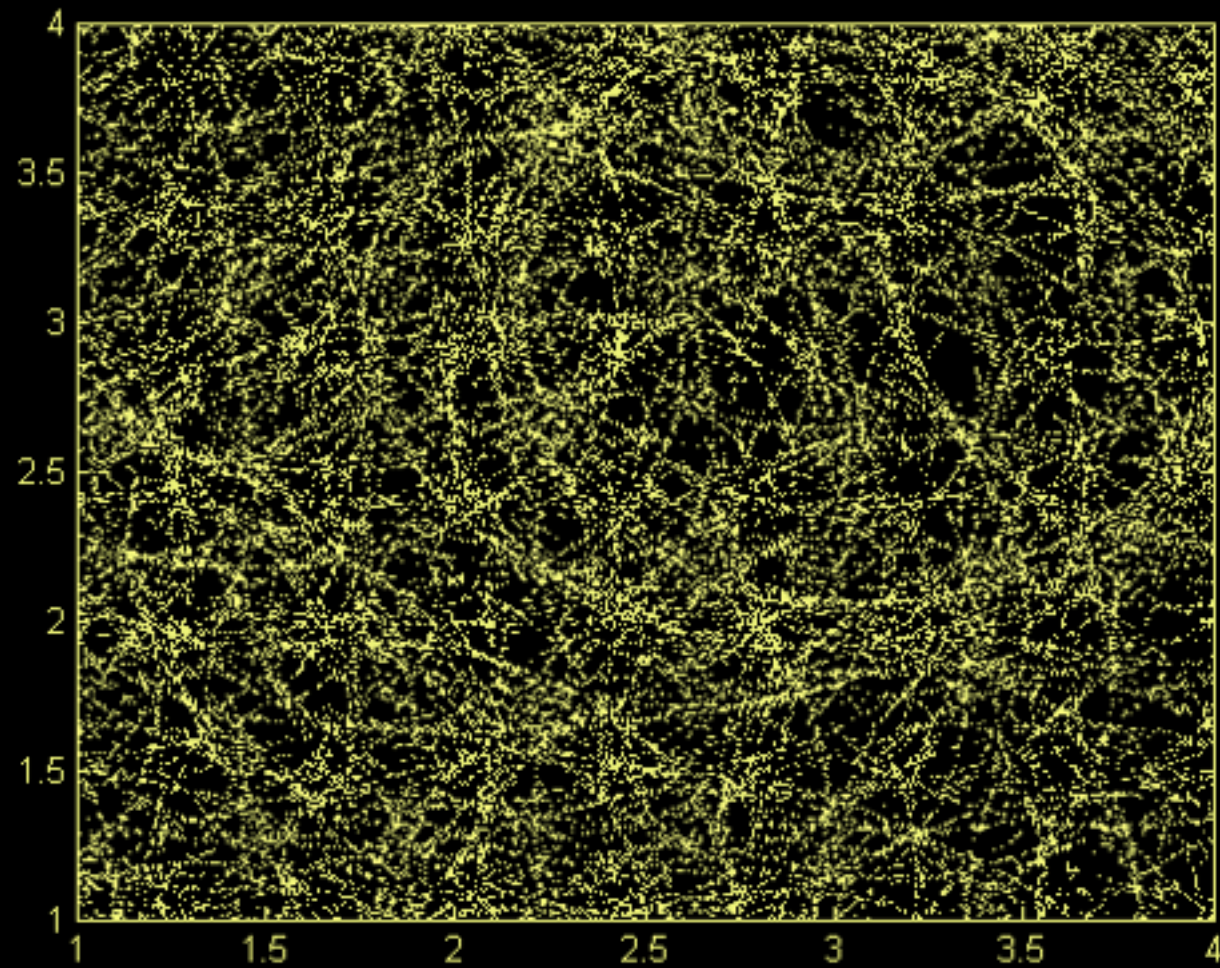
★ in collaboration with Gabriela C. Carvalho,
Mícol Benetti, Jailson Alcaniz, and Joel Carvalho



BAO

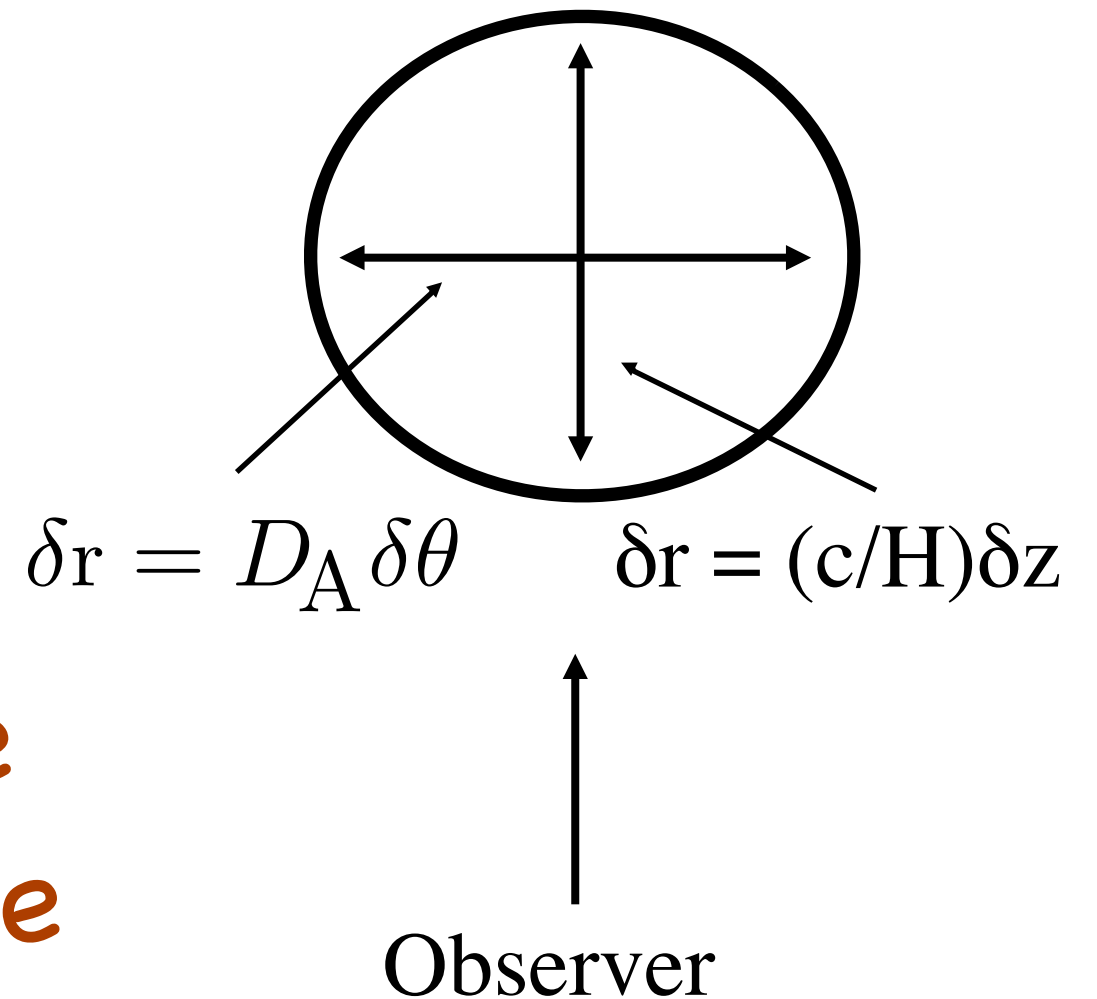


BAO: cosmological ruler



2-point correlation function

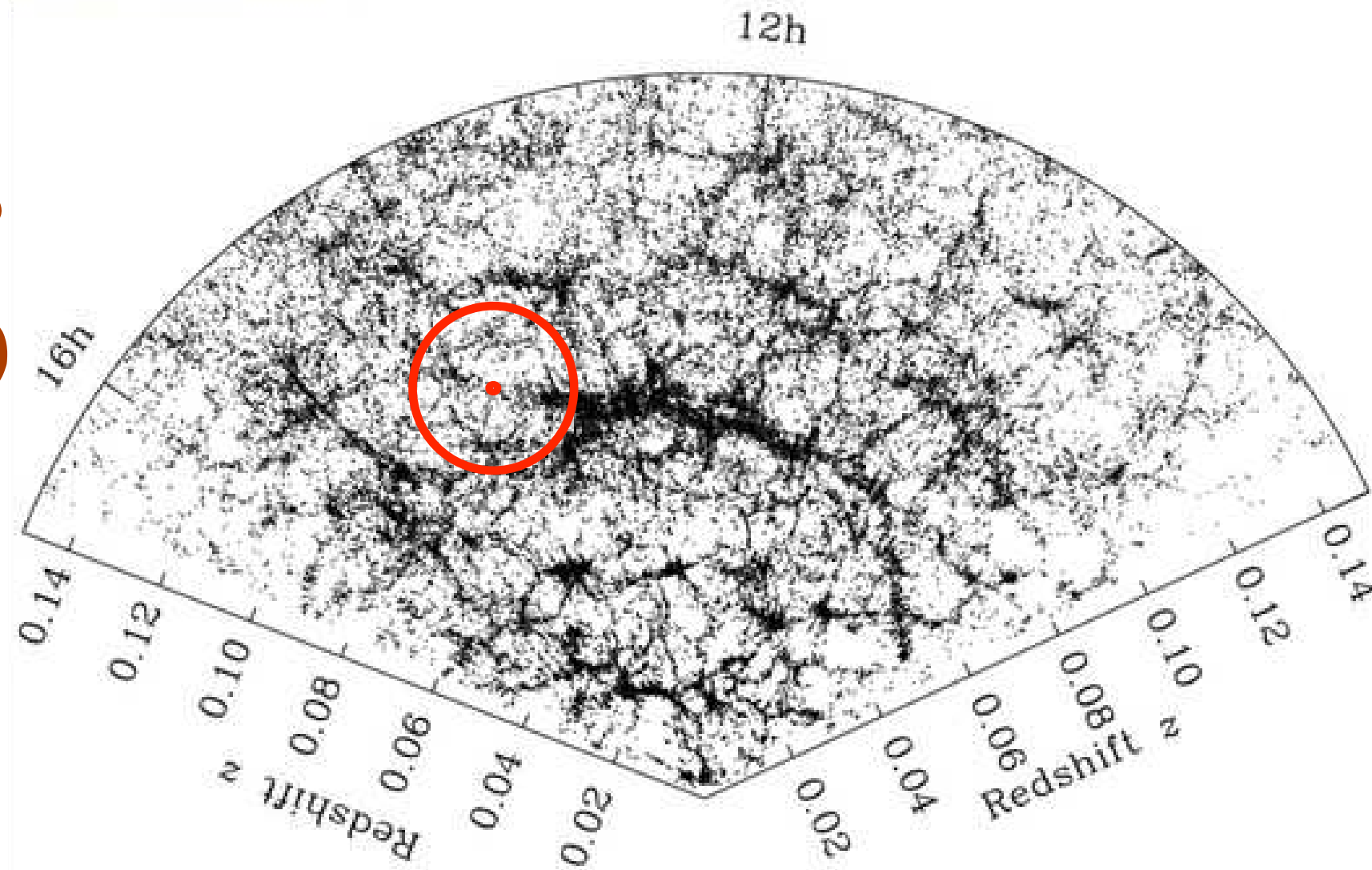
BAO: cosmological ruler



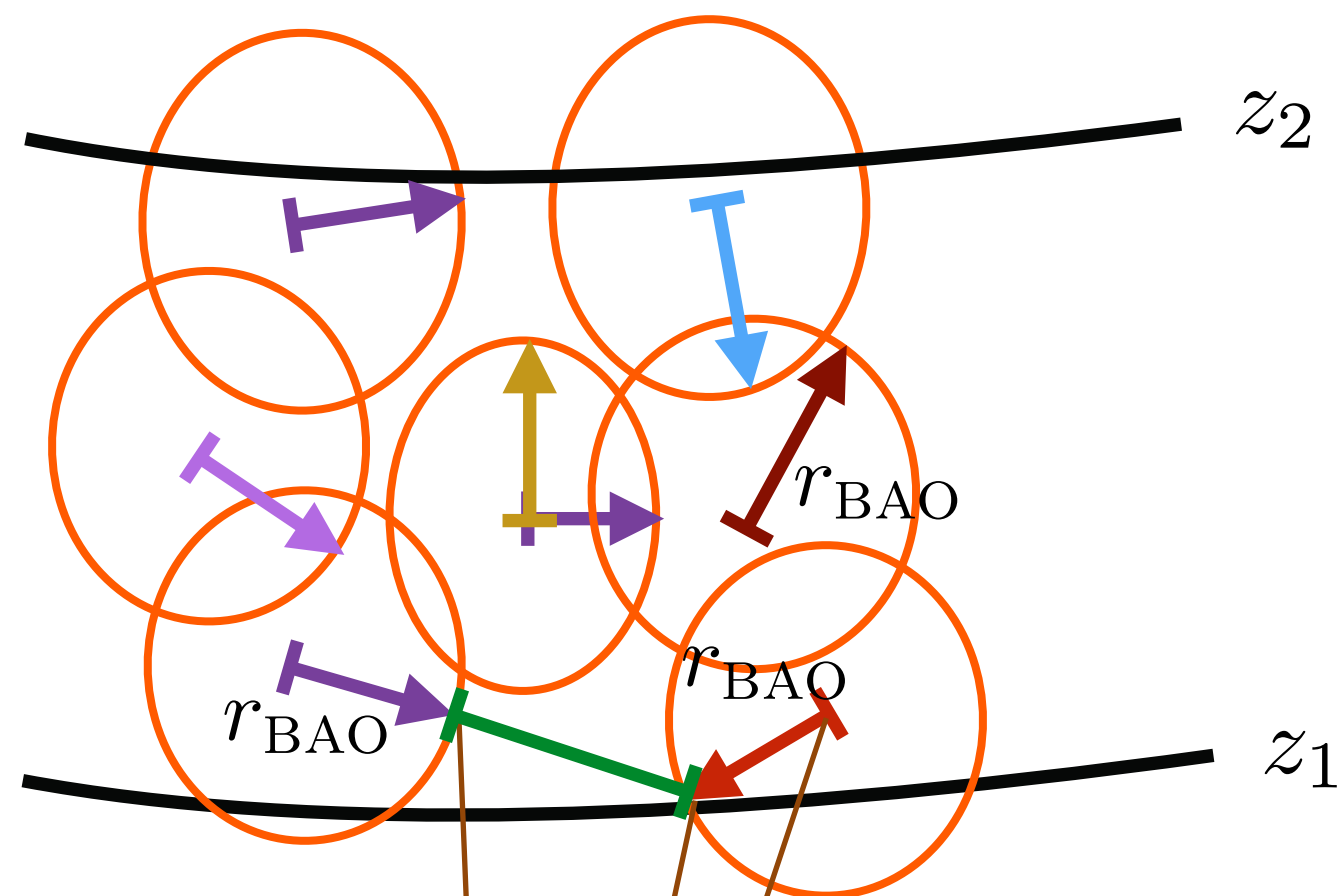
2PACF*: a tool to explore
transversal-BAO signature

*2-point angular correlation function

Analyses with galaxy surveys e.g., SDSS-DR10

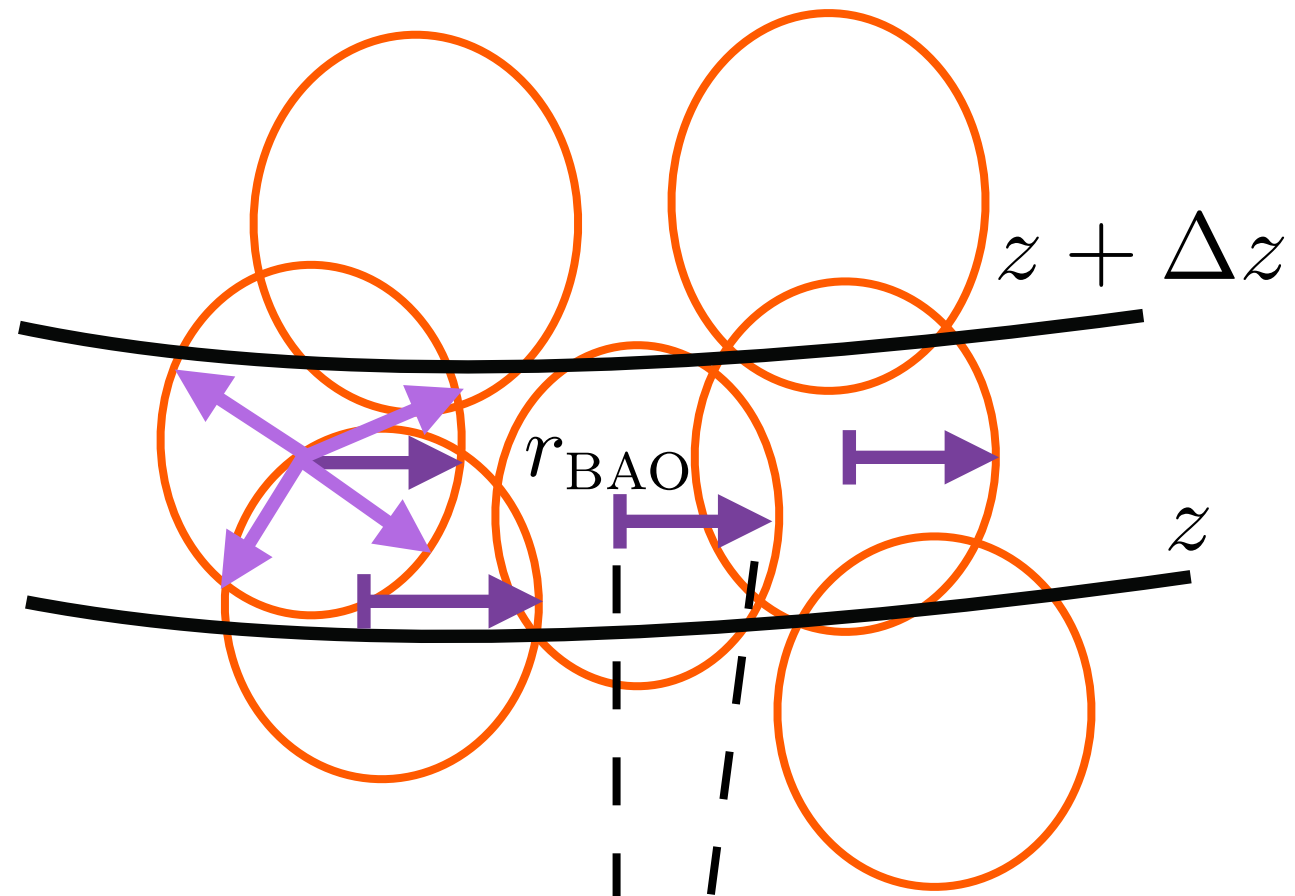


- Motivation: To restrict cosmological models and parameters in a model independent way
- What do we do: Precise measurements of $DA(z)$ without assuming a fiducial cosmology.



$$r_{\text{BAO}}^{\text{radial}} = \frac{c}{H(z)} \Delta z$$

$$r_{\text{BAO}}^{\text{transv}} = \theta_{\text{BAO}} D_A (1 + z)$$



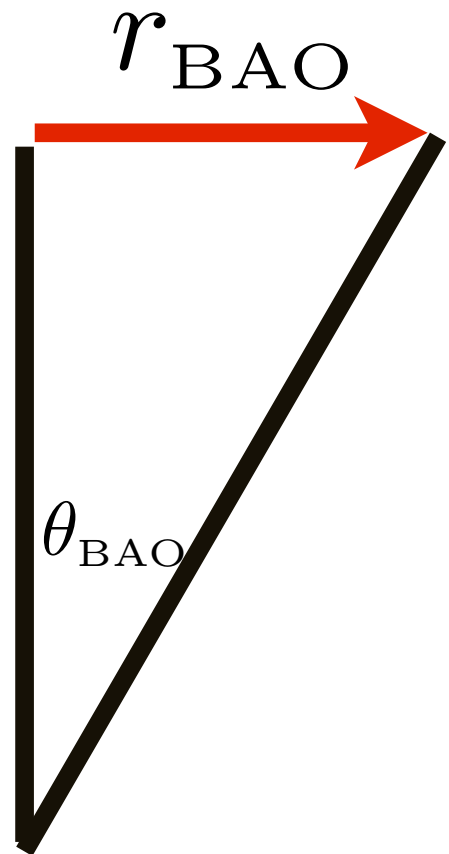
$$\theta_{\text{BAO}} \simeq \frac{r_{\text{BAO}}}{D_A (1 + \langle z \rangle)}$$

$$r_{\text{BAO}} \simeq 105 \text{ Mpc}/h$$

$$D_A = \frac{r_{\text{BAO}}}{(1+z)\theta_{\text{BAO}}}$$

$$r_{\text{BAO}} \simeq 105 \text{ Mpc}/h$$

$$\theta_{\text{BAO}} = \frac{r_{\text{BAO}}}{(1+z)D_A}$$

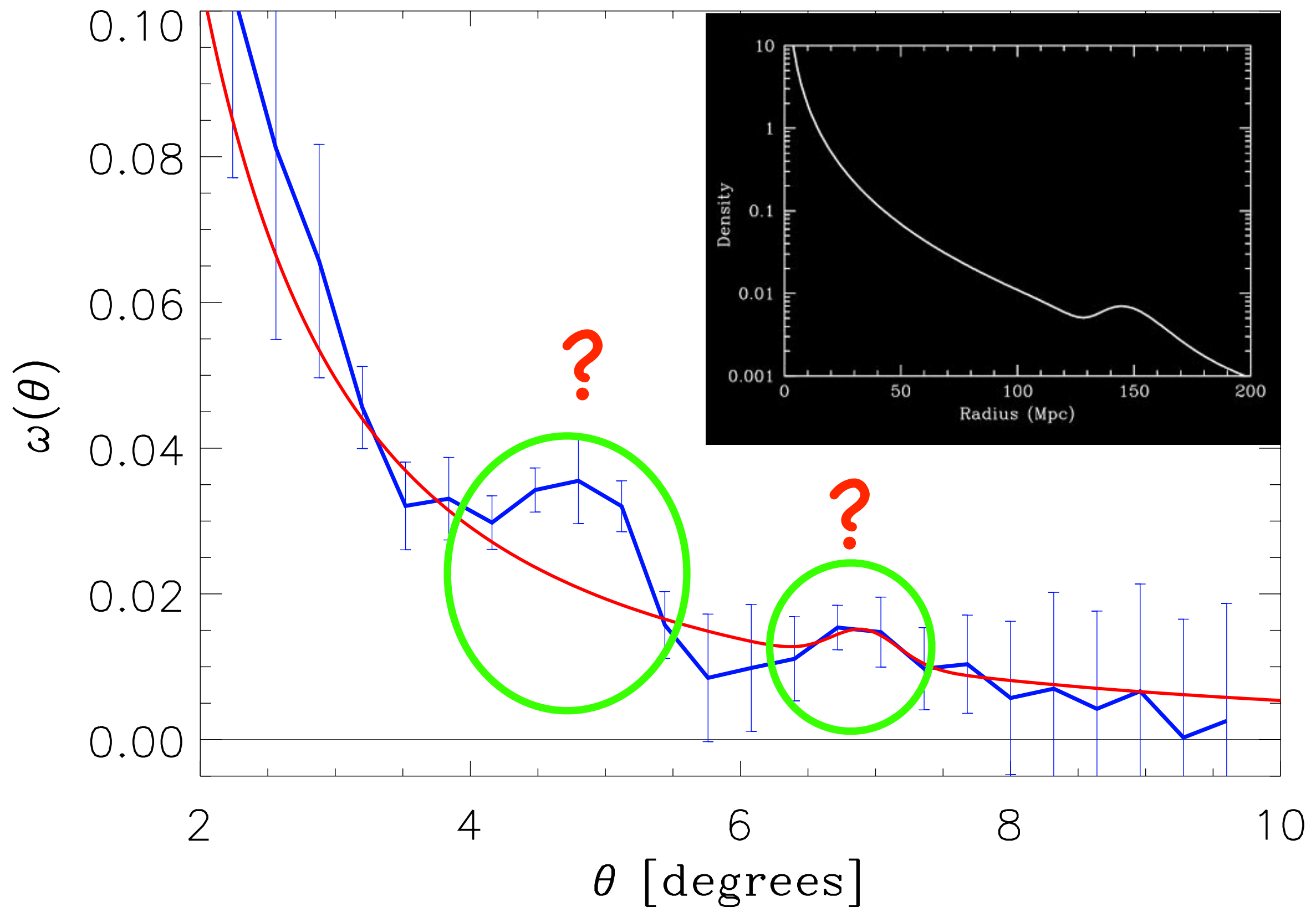


Finding θ_{BAO} in the 2PACF in thin bin-redshift shells $\Delta z \simeq 0.01$

SDSS-DR10

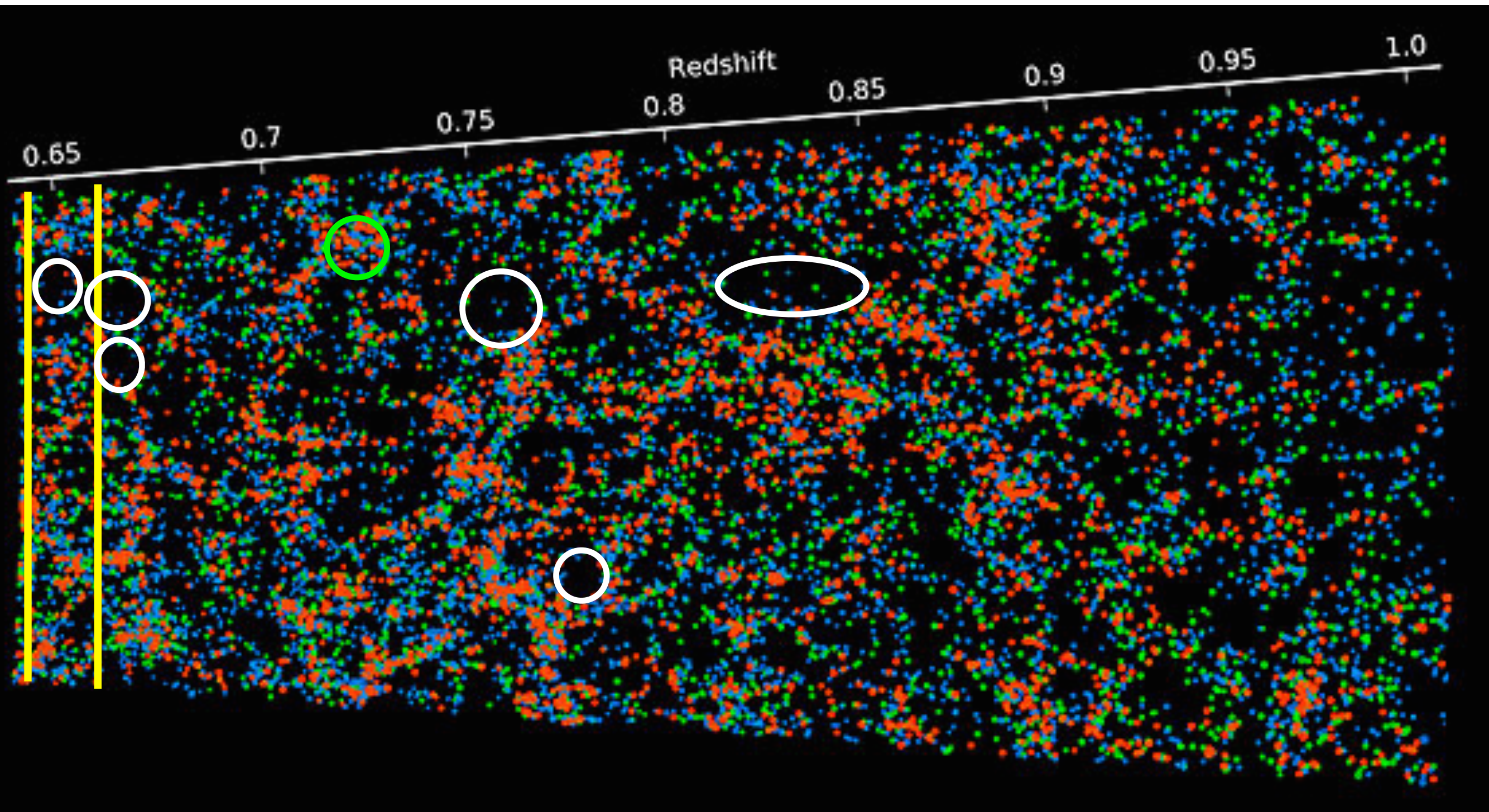
redshift intervals	number of LRGs	$\bar{z}$	δz
0.440 - 0.460	21,862	0.45	0.02
0.465 - 0.475	17,536	0.47	0.01
0.480 - 0.500	40,957	0.49	0.02
0.505 - 0.515	21,046	0.51	0.01
0.525 - 0.535	22,147	0.53	0.01
0.545 - 0.555	21,048	0.55	0.01

Finding θ_{BAO} in the 2PACF



VIPERS survey catalog

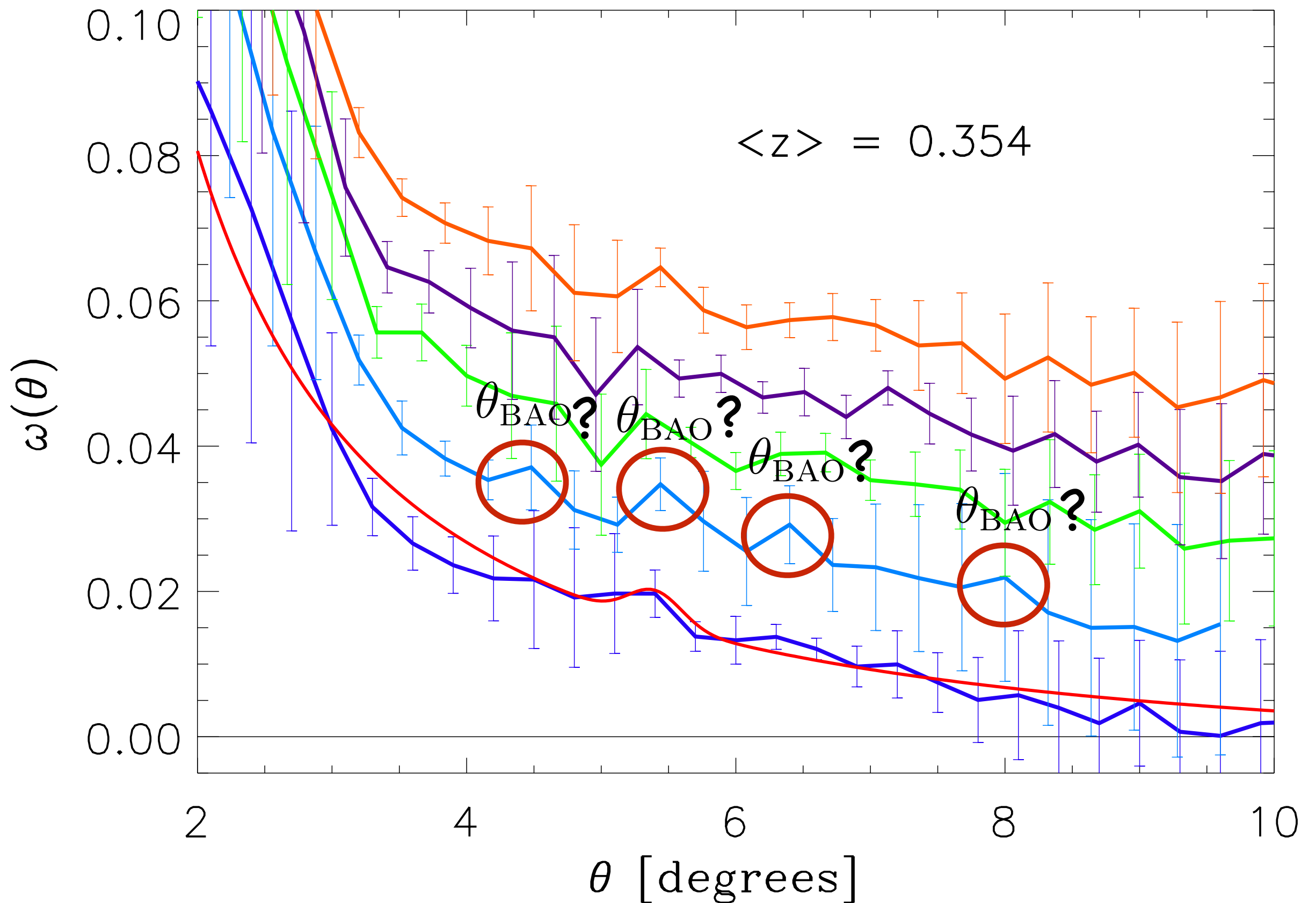
exm. under- & over-densities: voids & bulks



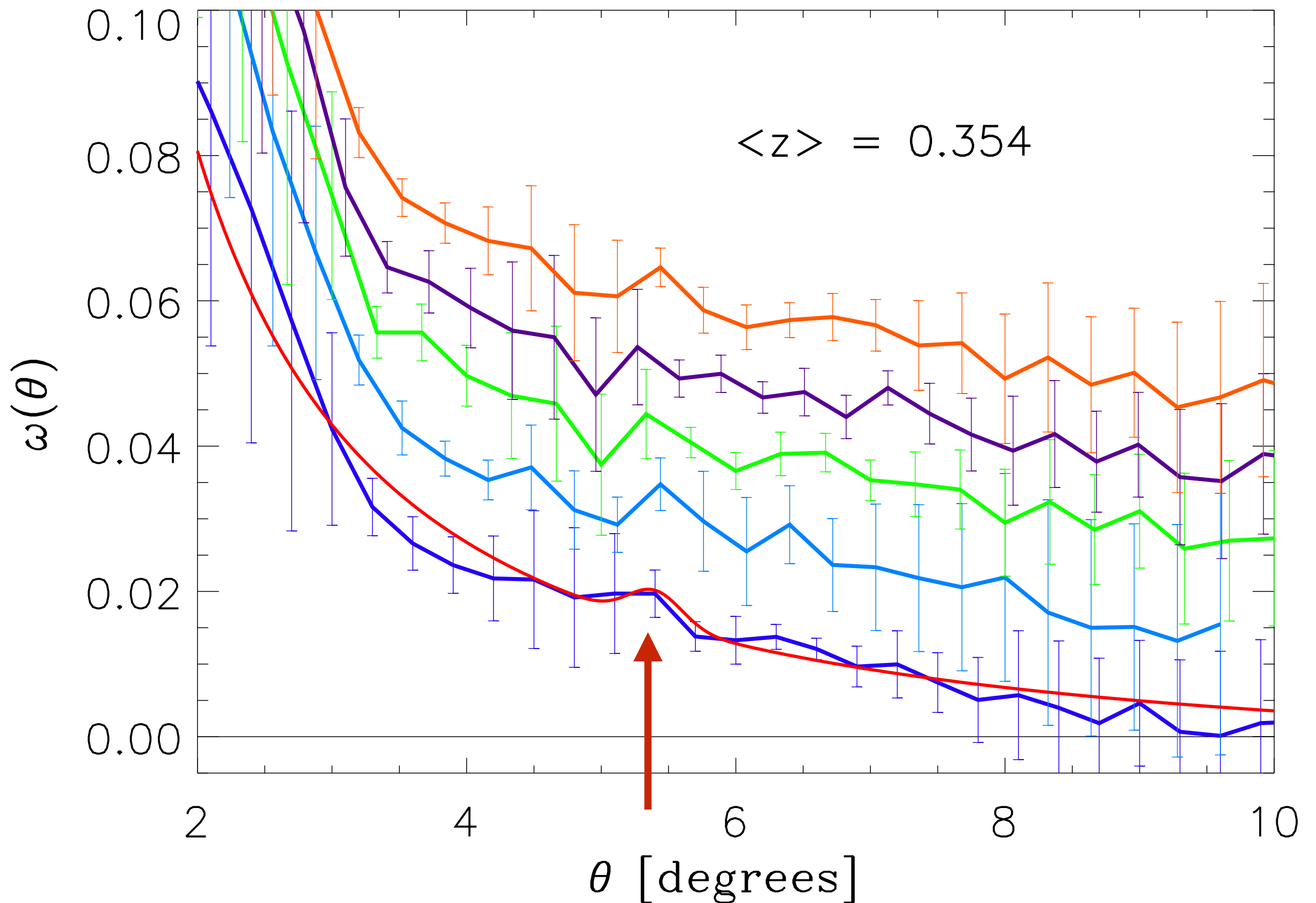
Model-independent ways
to find θ_{BAO}

1. Bin-size test

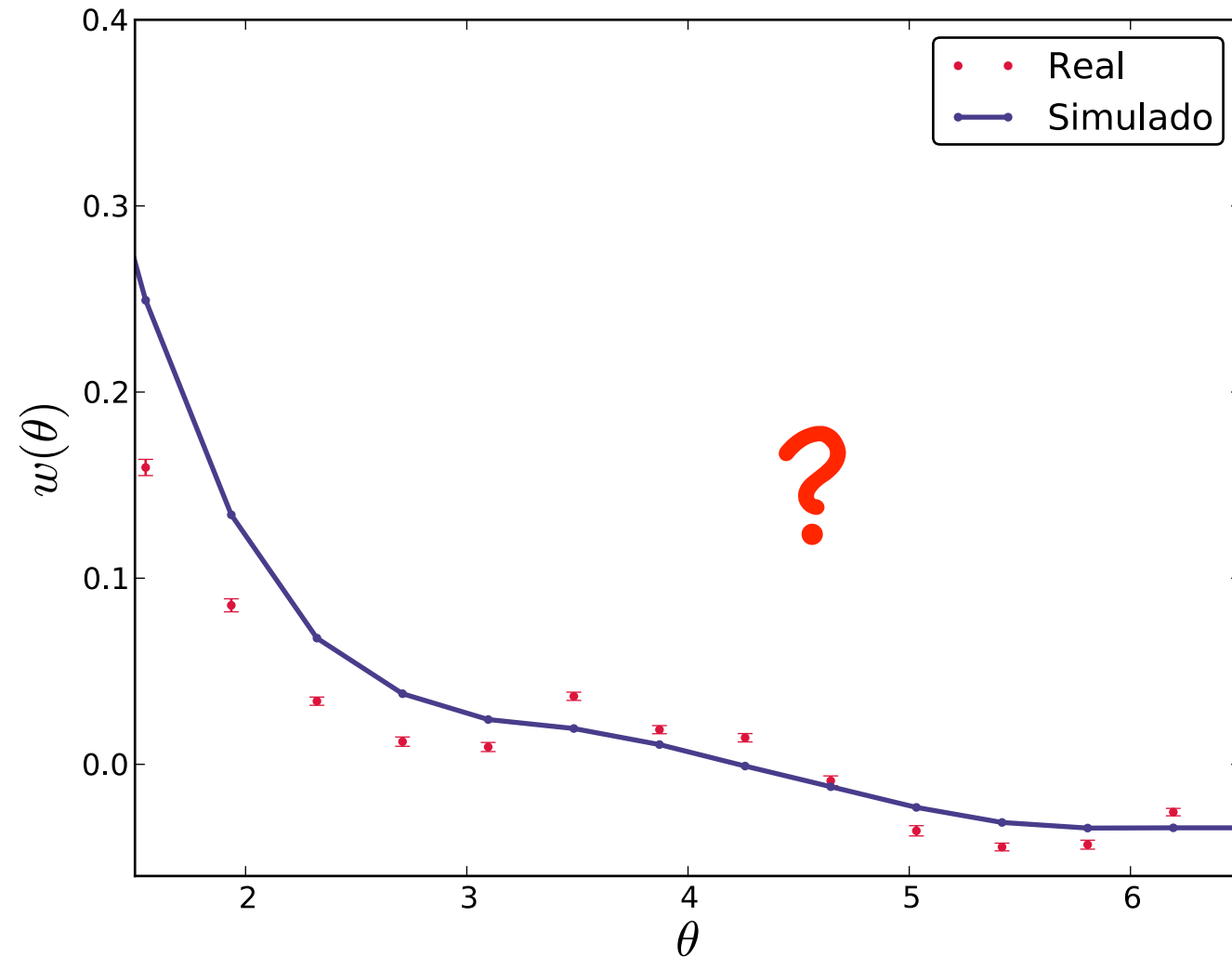
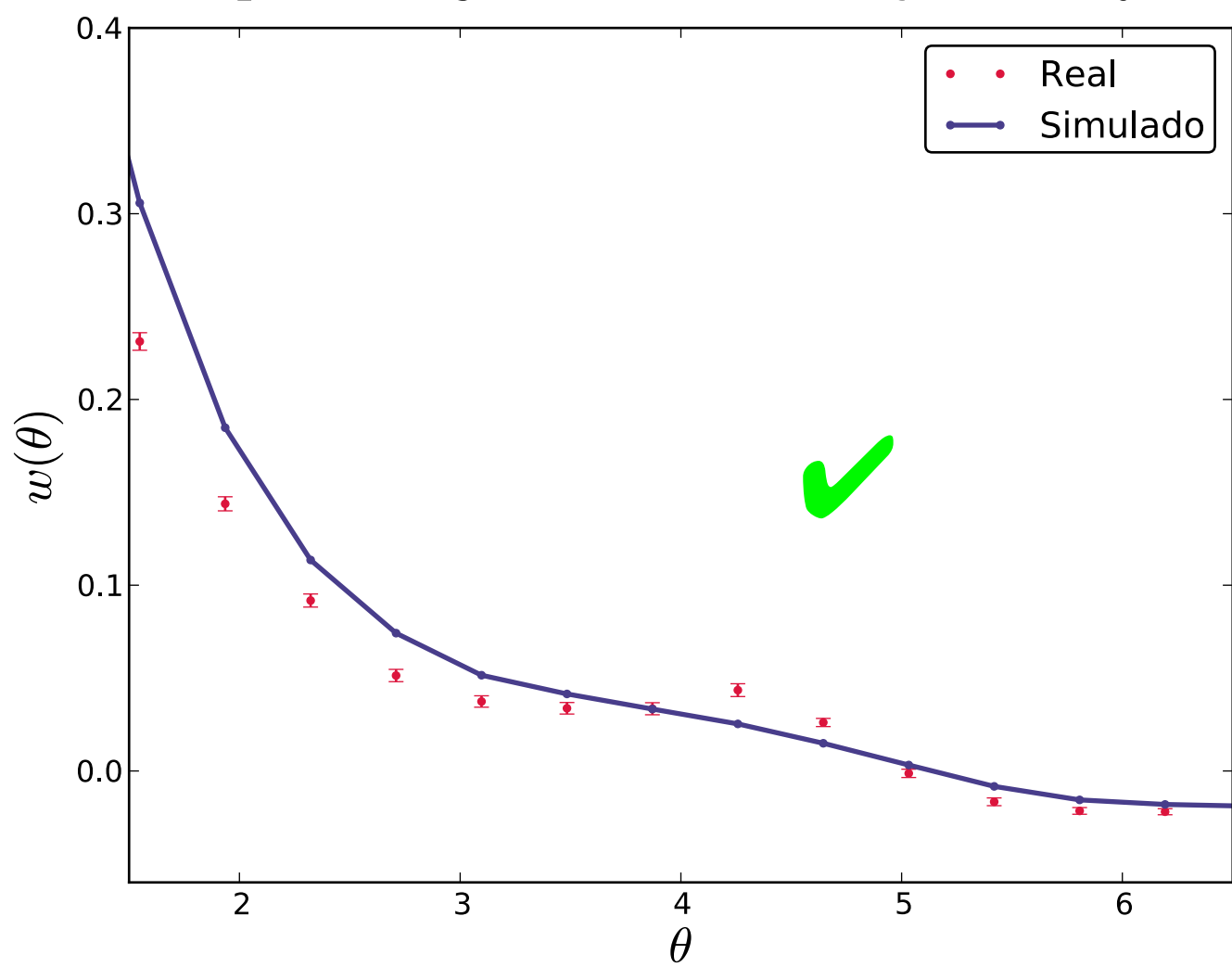
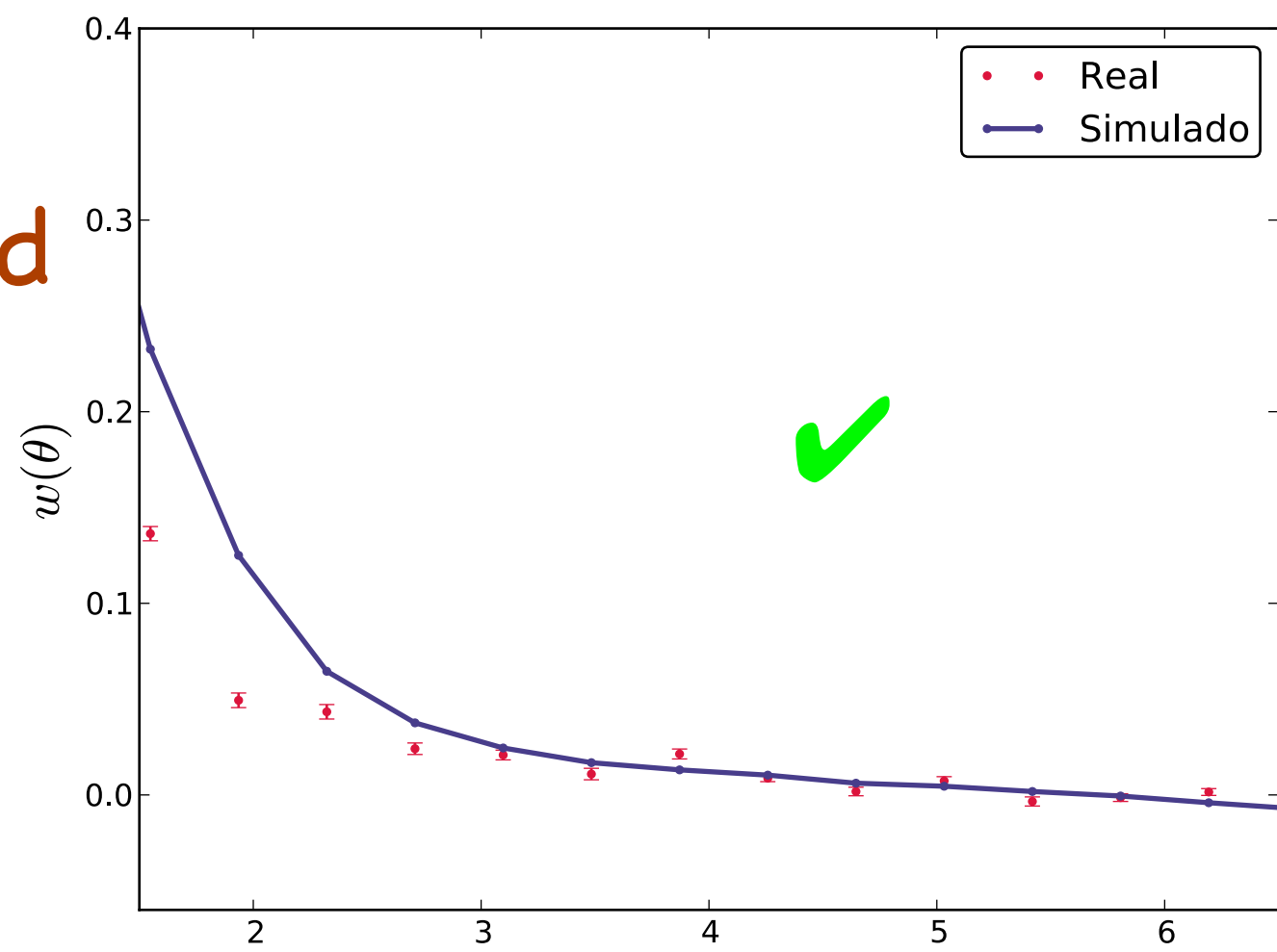
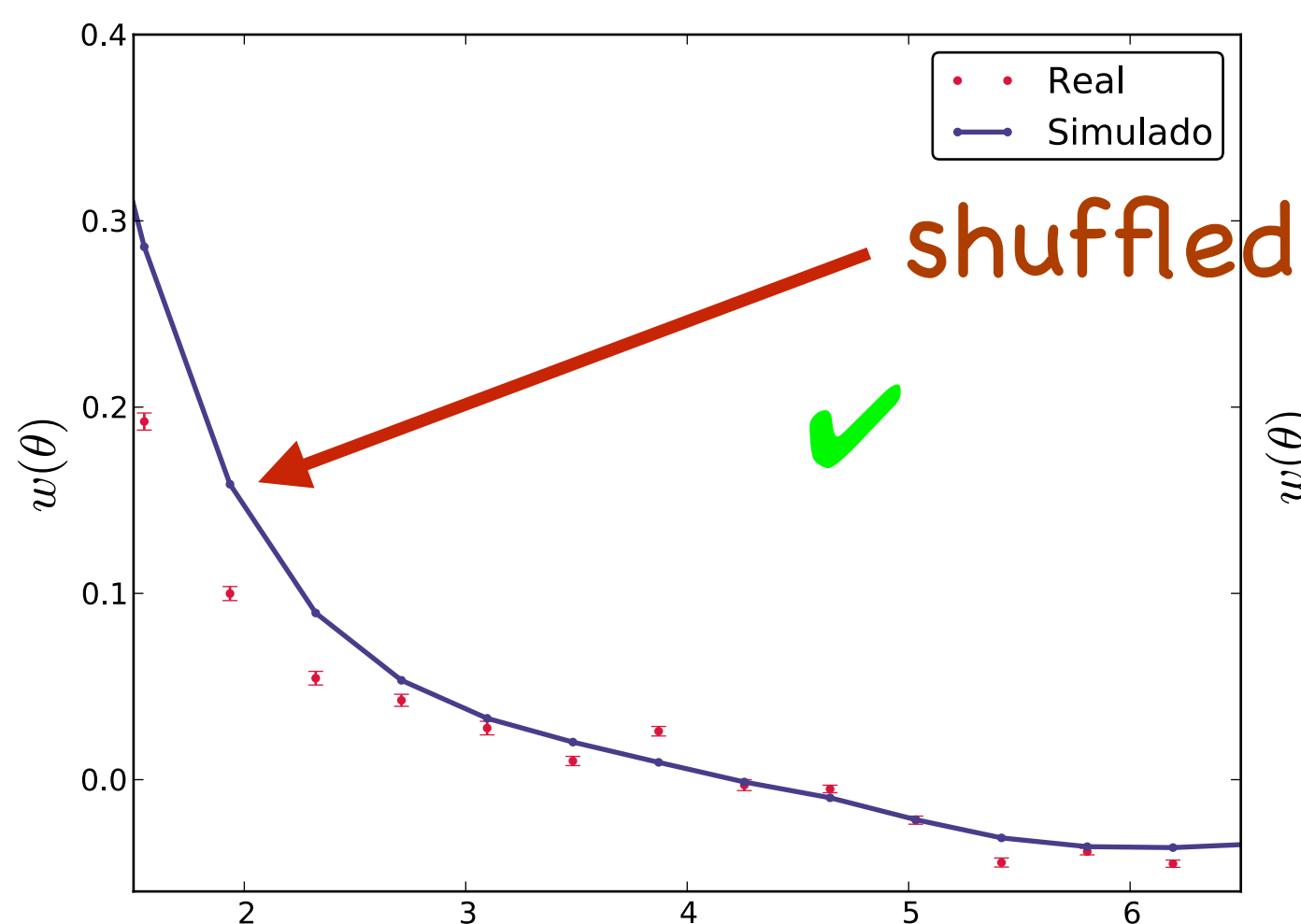
Where is the angular-BAO signal?



Where is the angular-BAO signal?

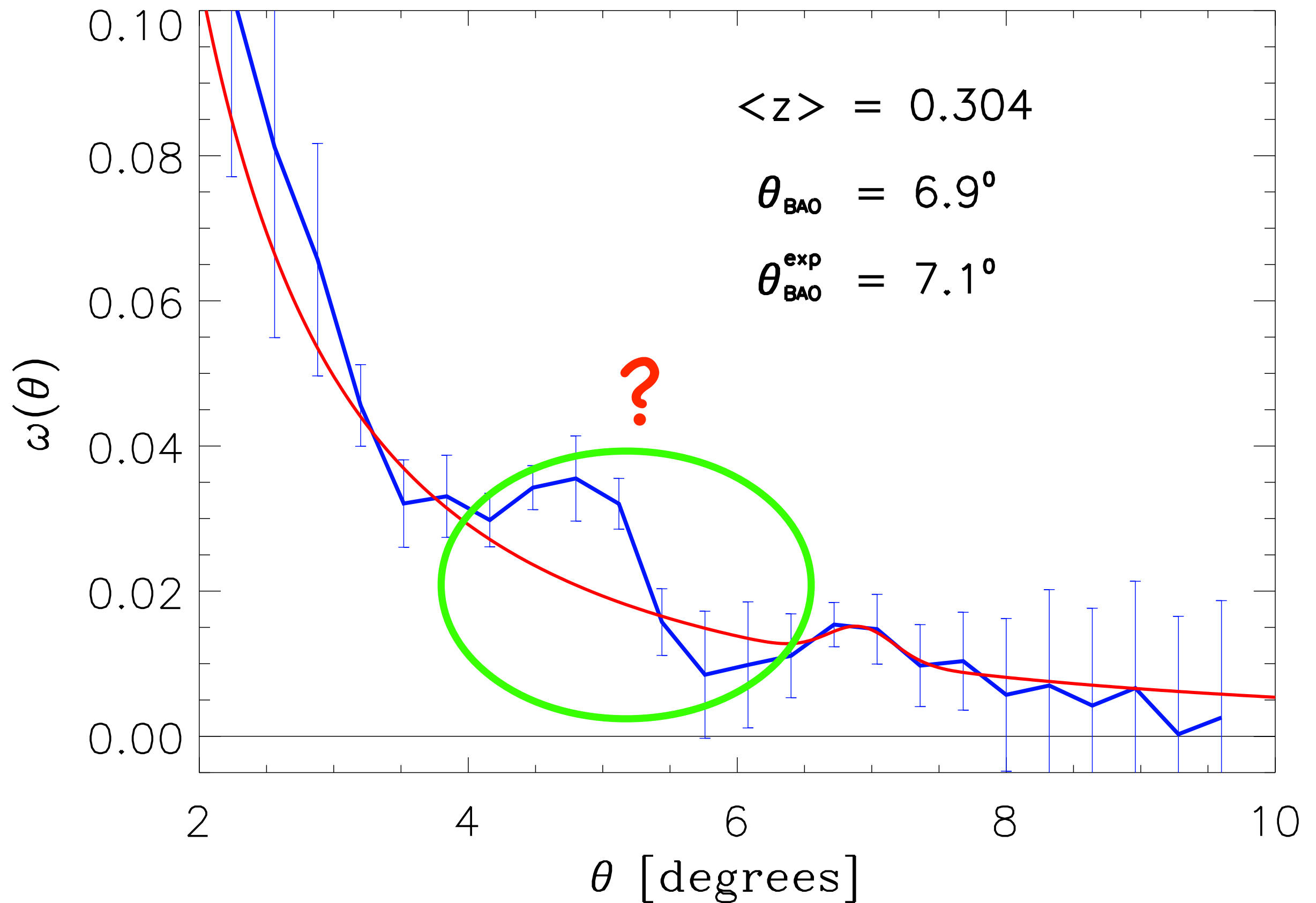


2. Shuffling gal's coordinates



Systematics: Problems or Opportunities?

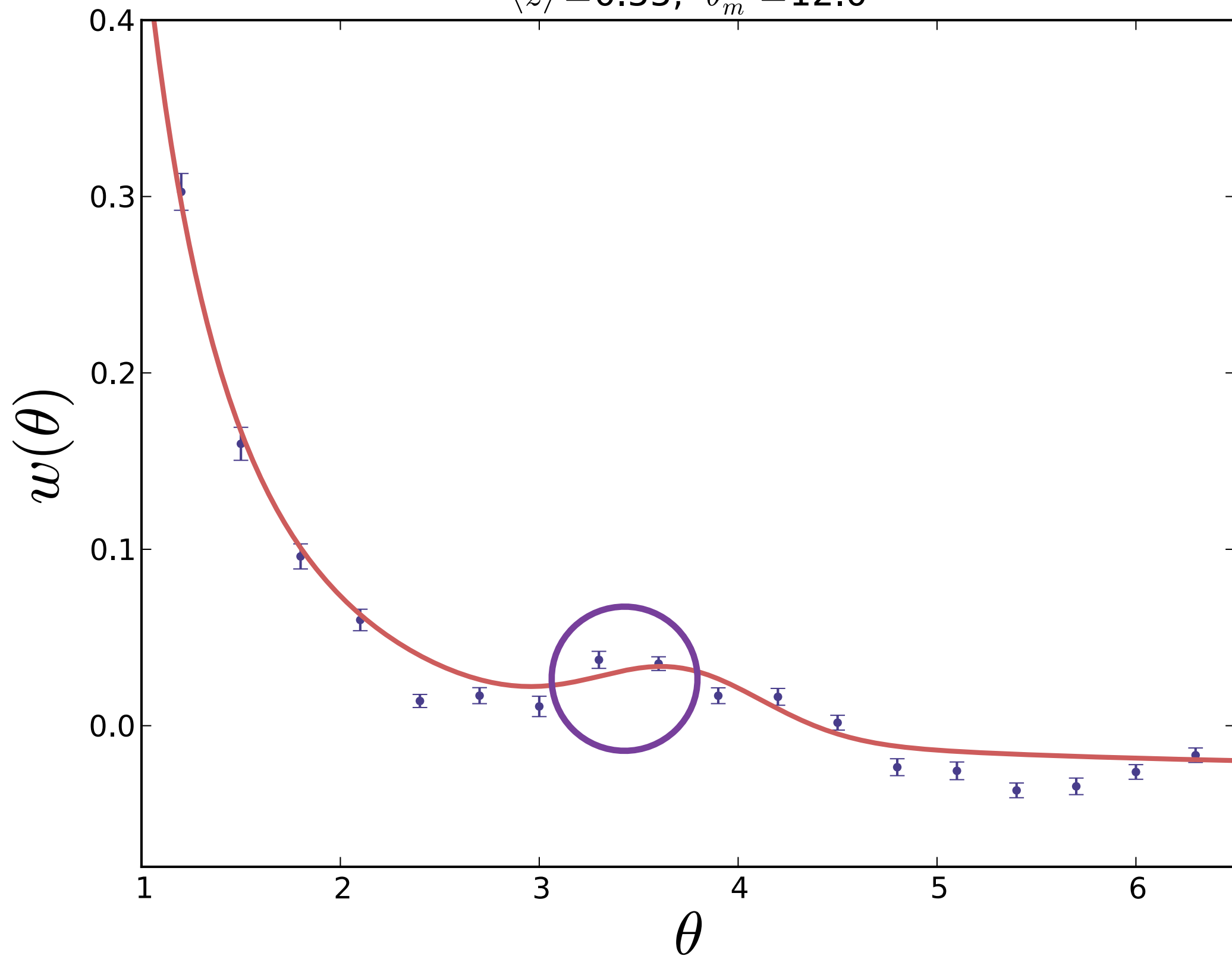
Systematics: Problems or Opportunities?



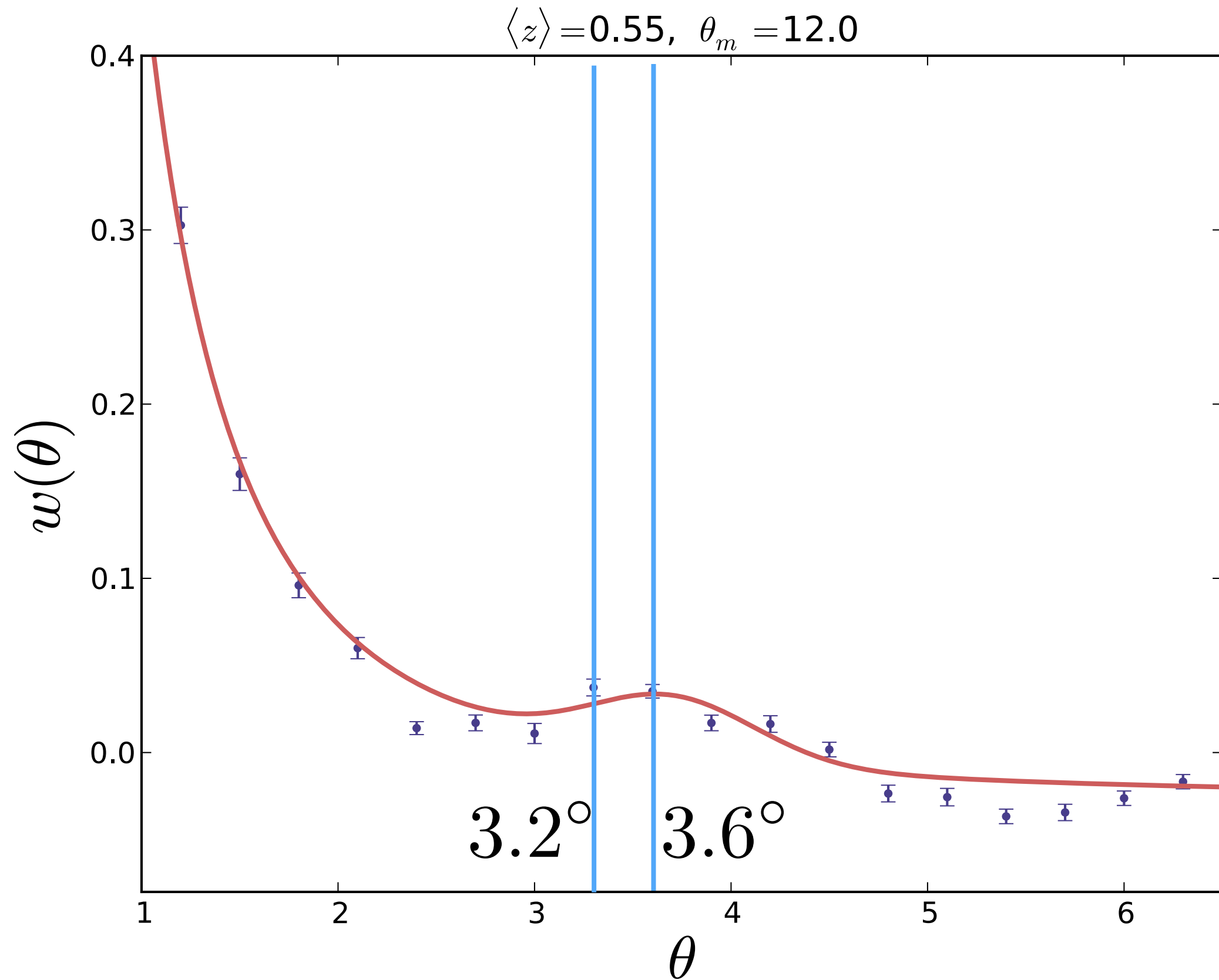
Let's see an specific example:

2PACF (SDSS-DR10): $0.545 < z < 0.555$

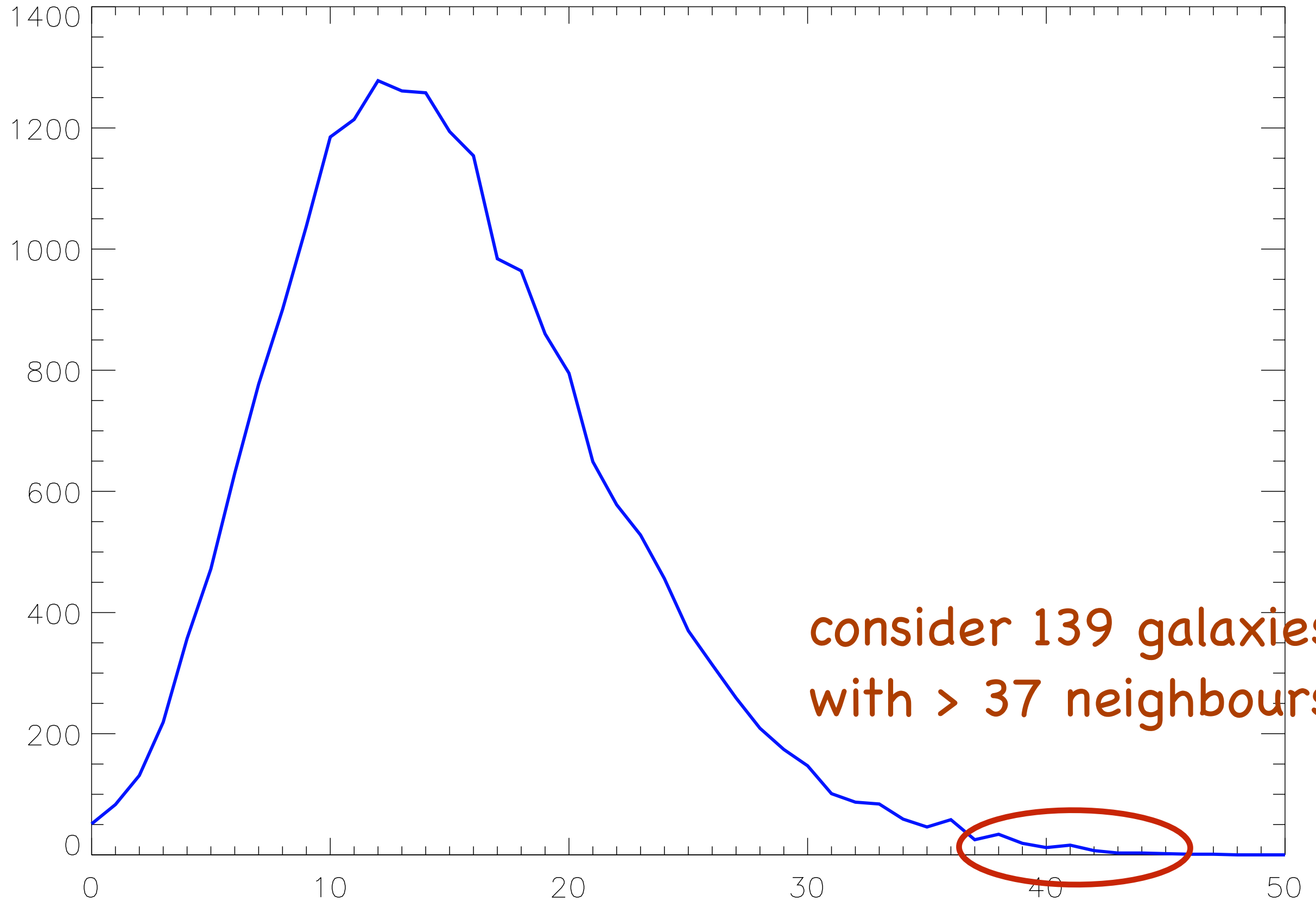
$\langle z \rangle = 0.55, \theta_m = 12.0$



2PACF (SDSS-DR10): $0.545 < z < 0.555$

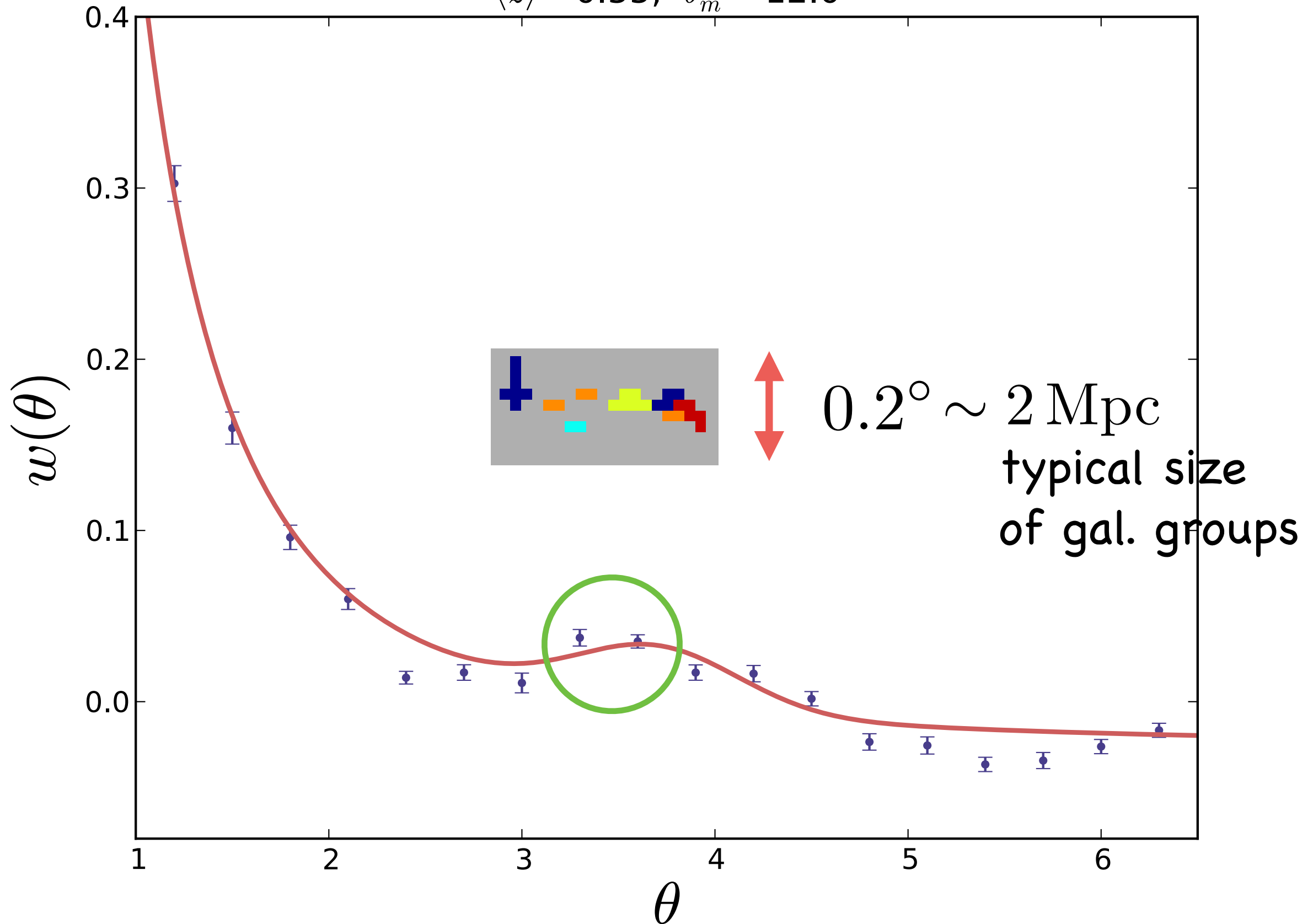


Histogram of neighbours for 3.2–3.6 degs.



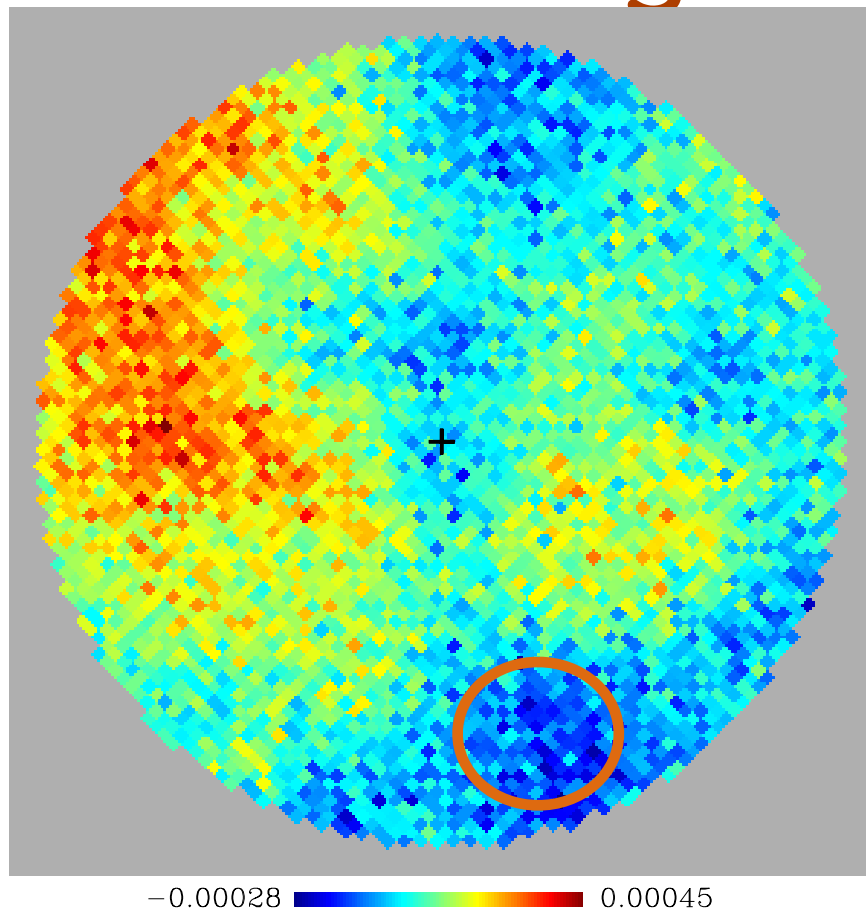
2PACF (SDSS-DR10): $0.545 < z < 0.555$

$$\langle z \rangle = 0.55, \quad \theta_m = 12.0$$

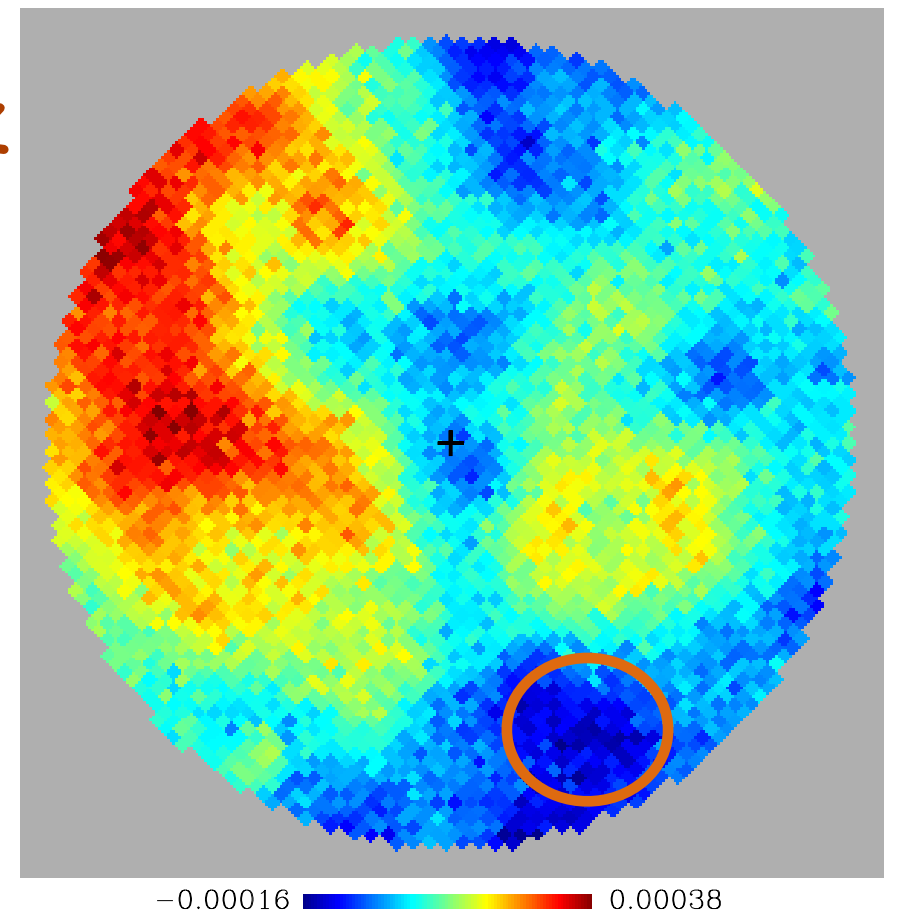


Looking for SZ-effect

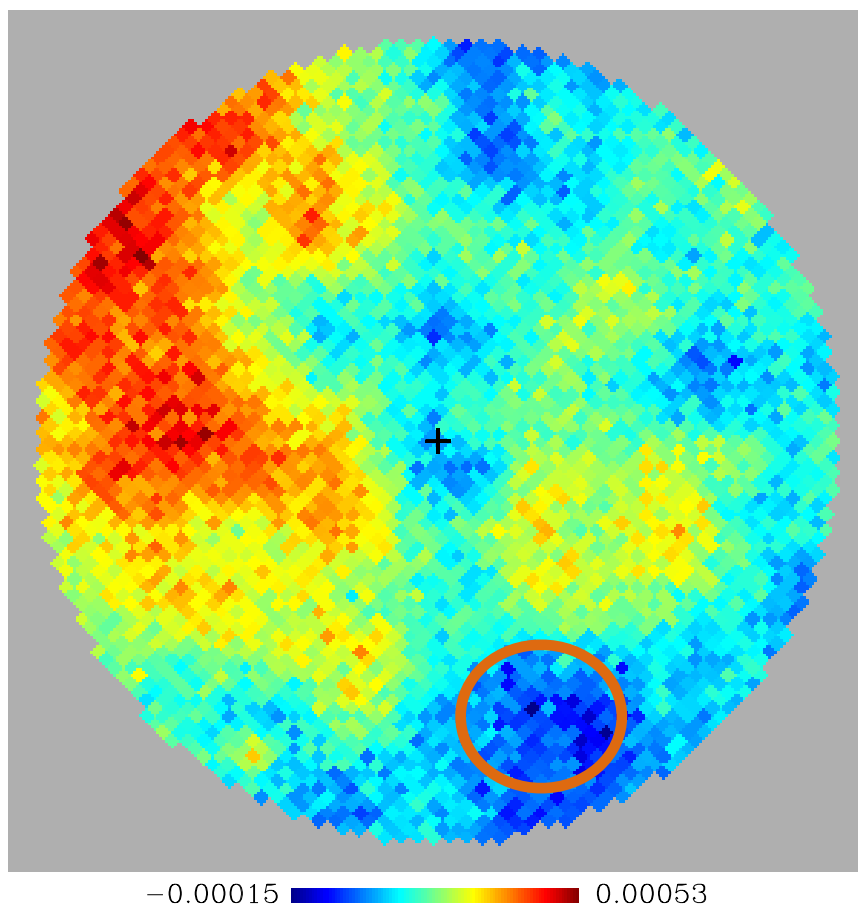
100 GHz



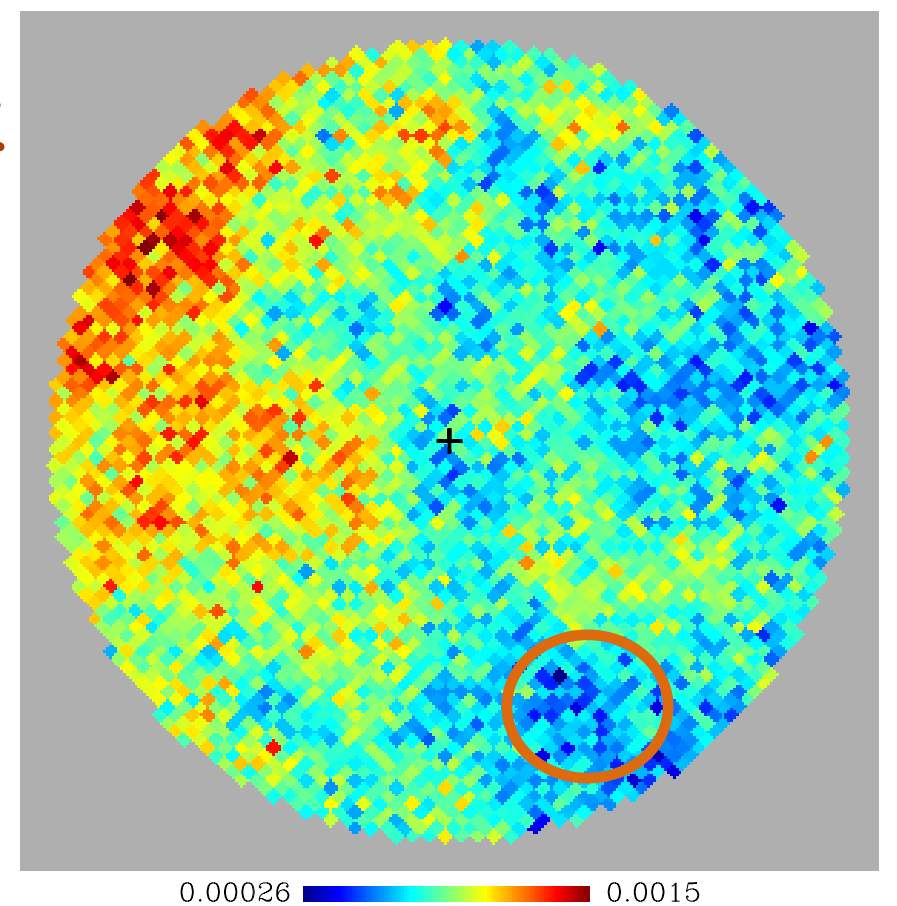
143 GHz



217 GHz

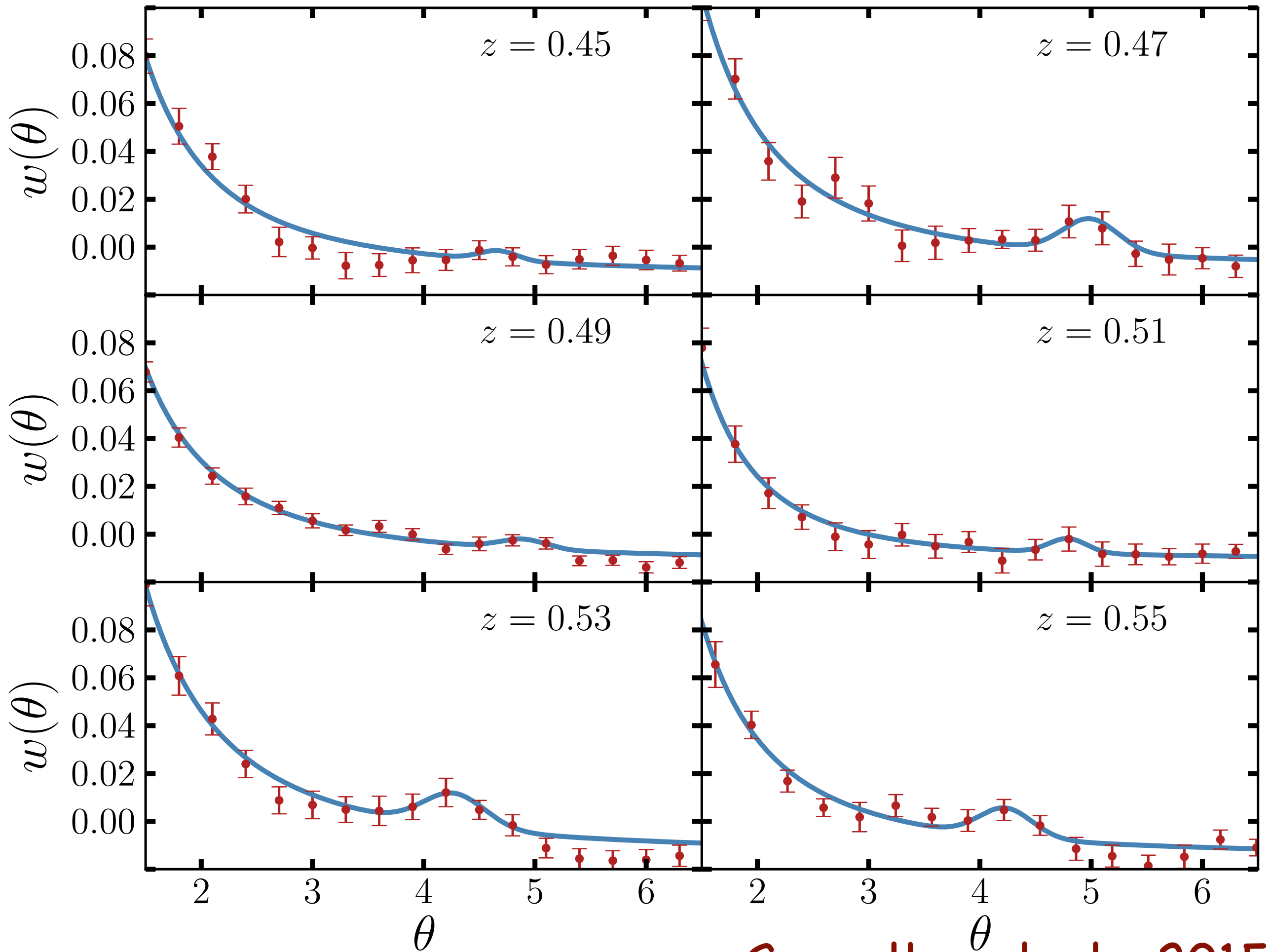


353 GHz

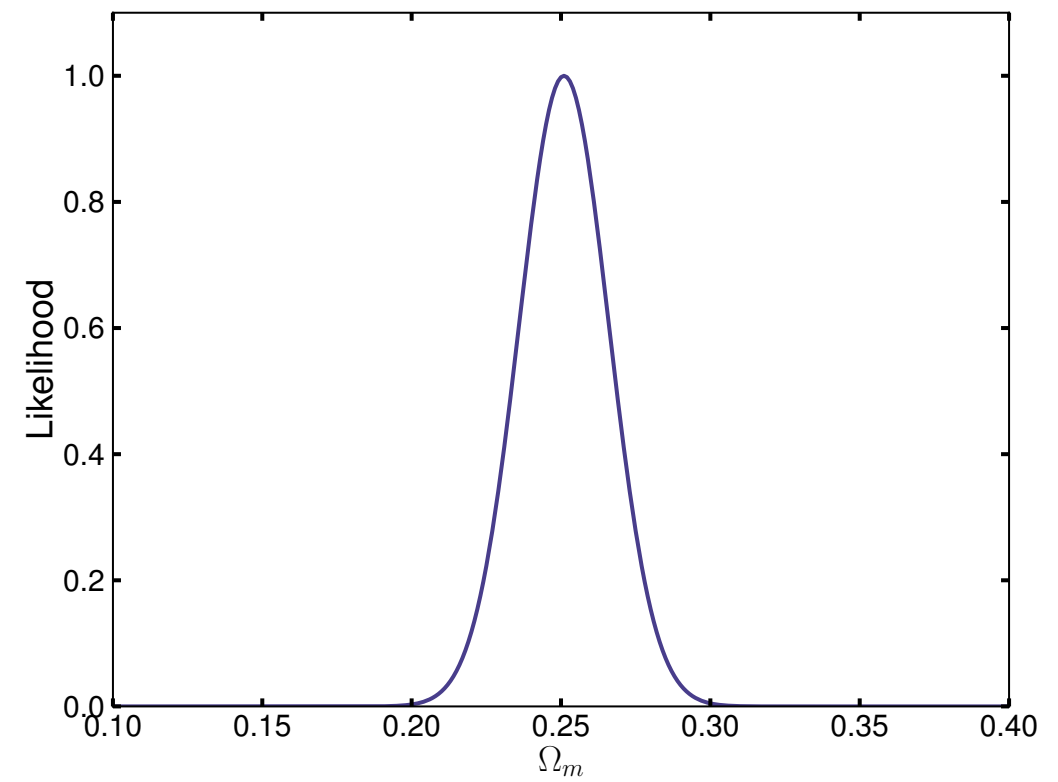
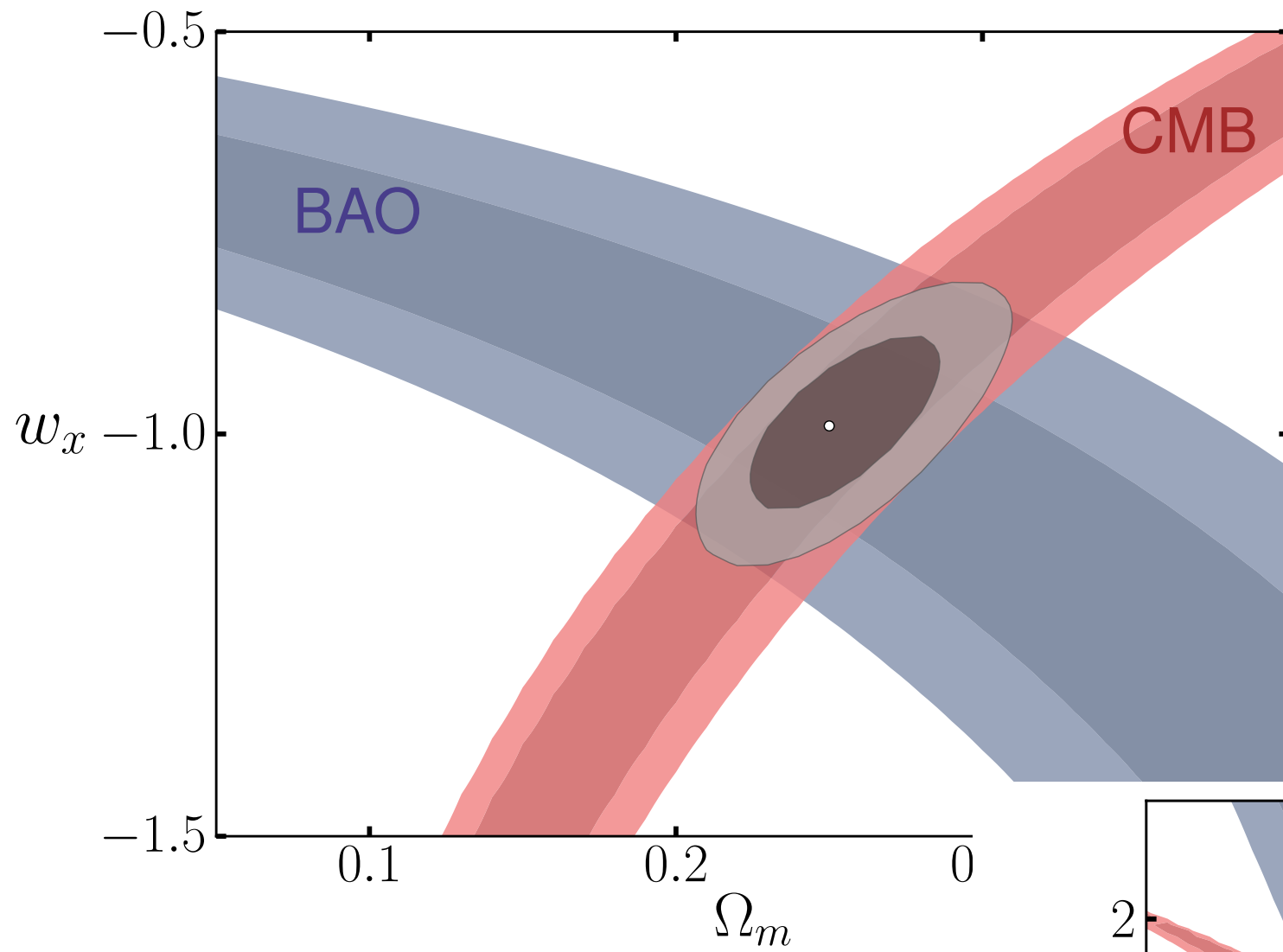


after understanding systematics,... results

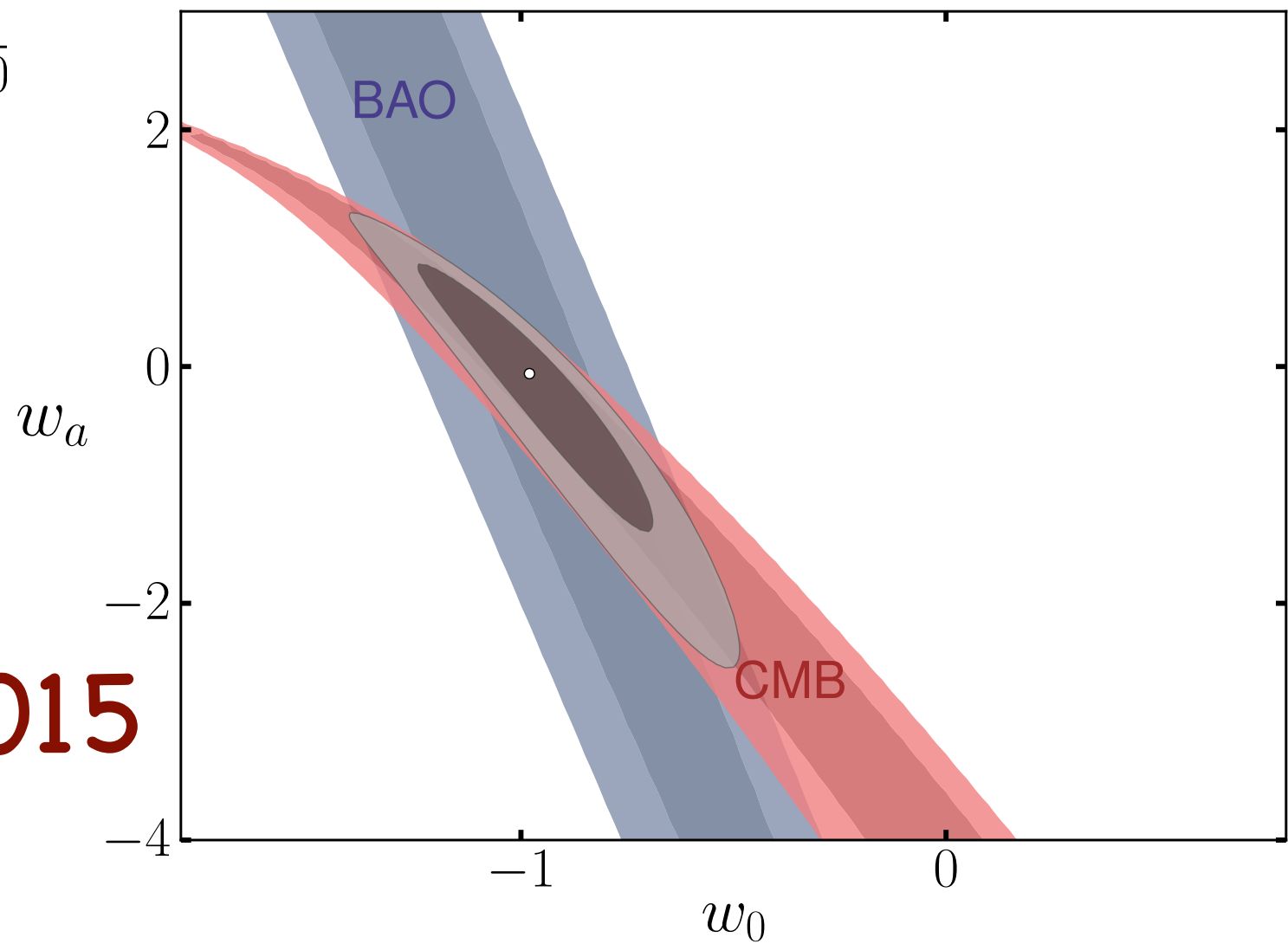
Carvalho et al., 2015

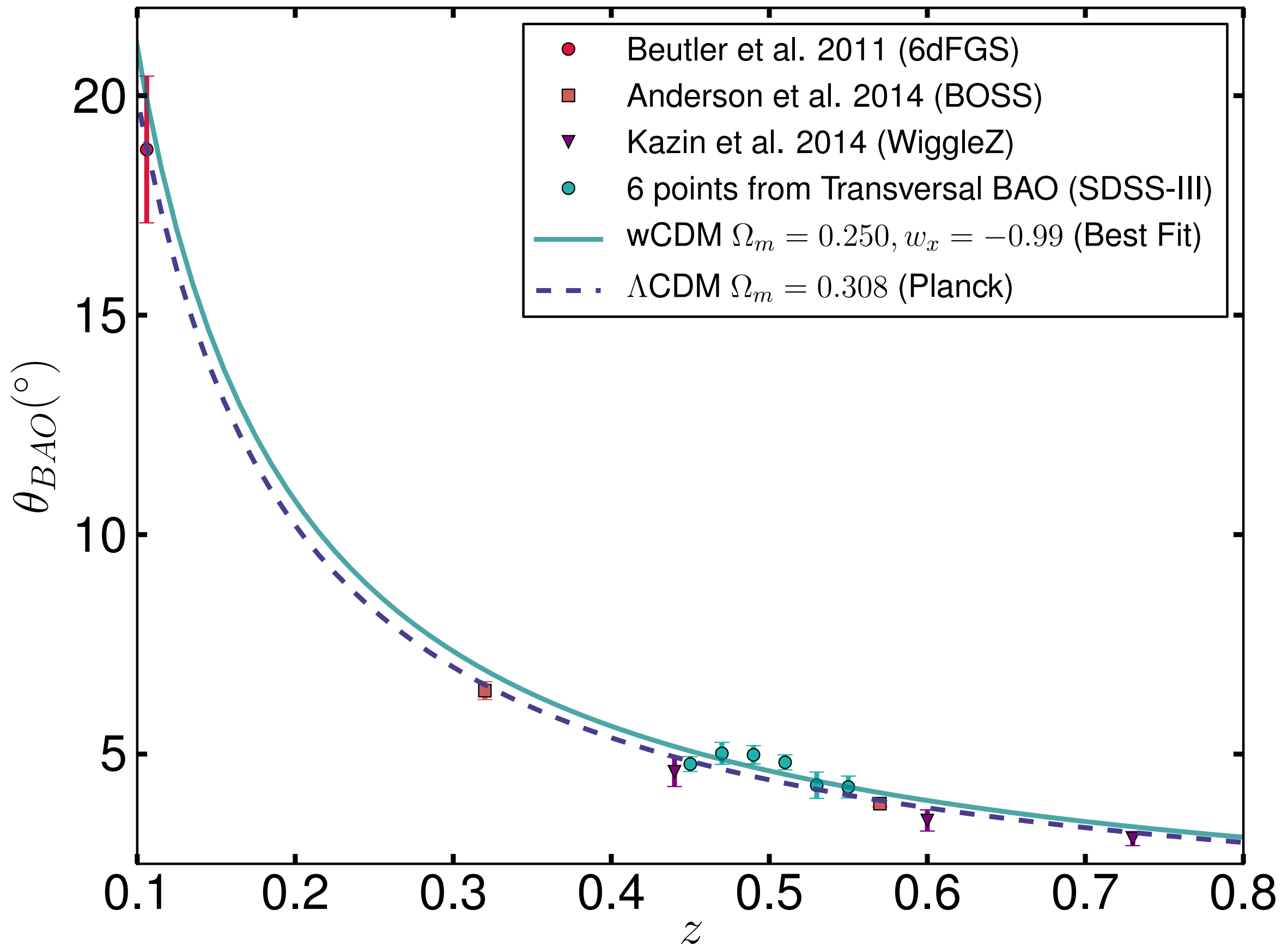


Carvalho et al., 2015



Carvalho et al., 2015





Carvalho et al., 2015

Conclusions

- $D_A(z)$ obtained in a **model independent** way through the Ang-BAO analyses! [but to understand **systematics** (n, gal. G&C) is crucial]
- In this way, one restricts cosmological models & parameters **without assuming a fid. model**
- This tomographic approach would be extended to other: cosmo. tracers & diff. redshift-bins