Galaxy clustering with photometric redshift probability distributions

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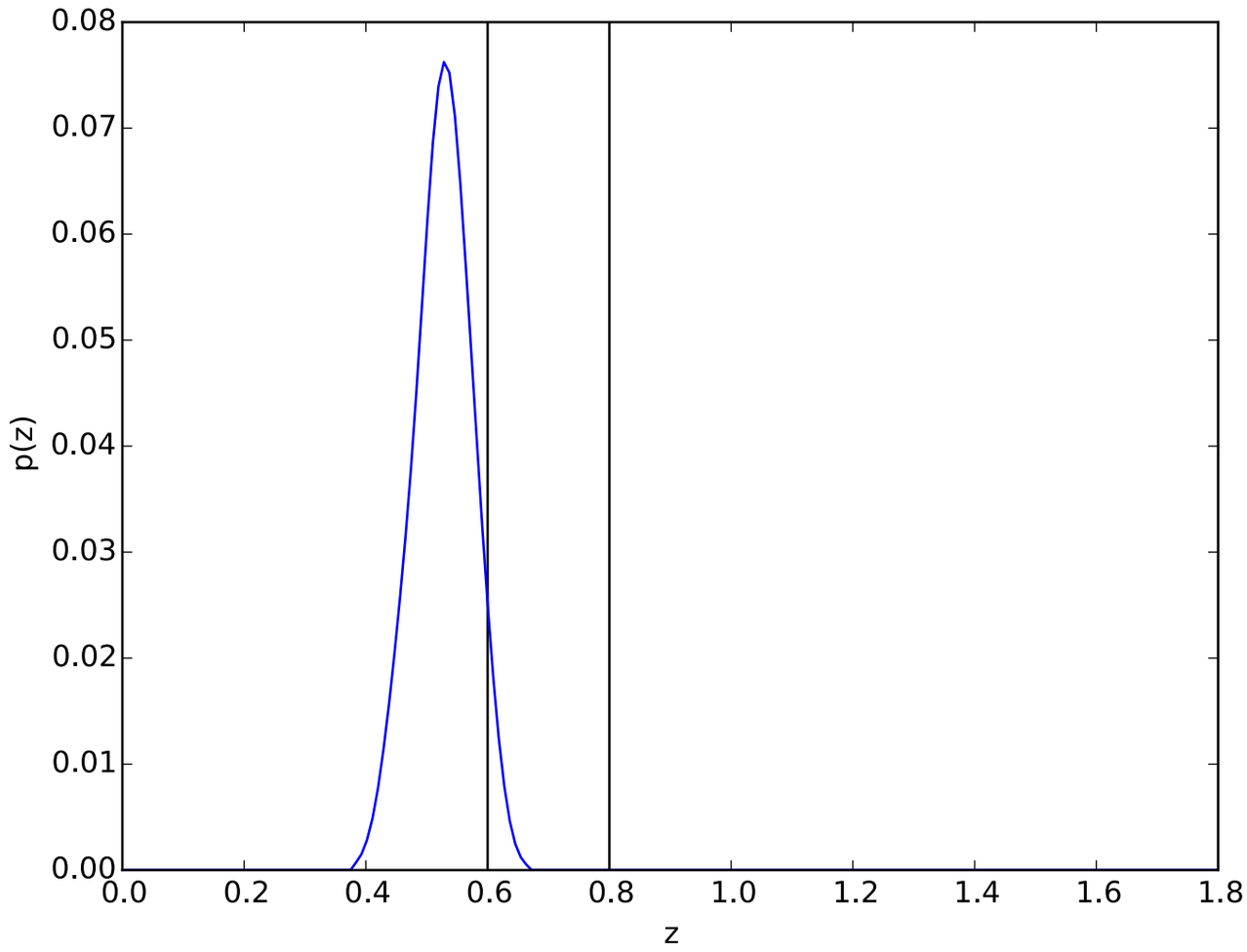
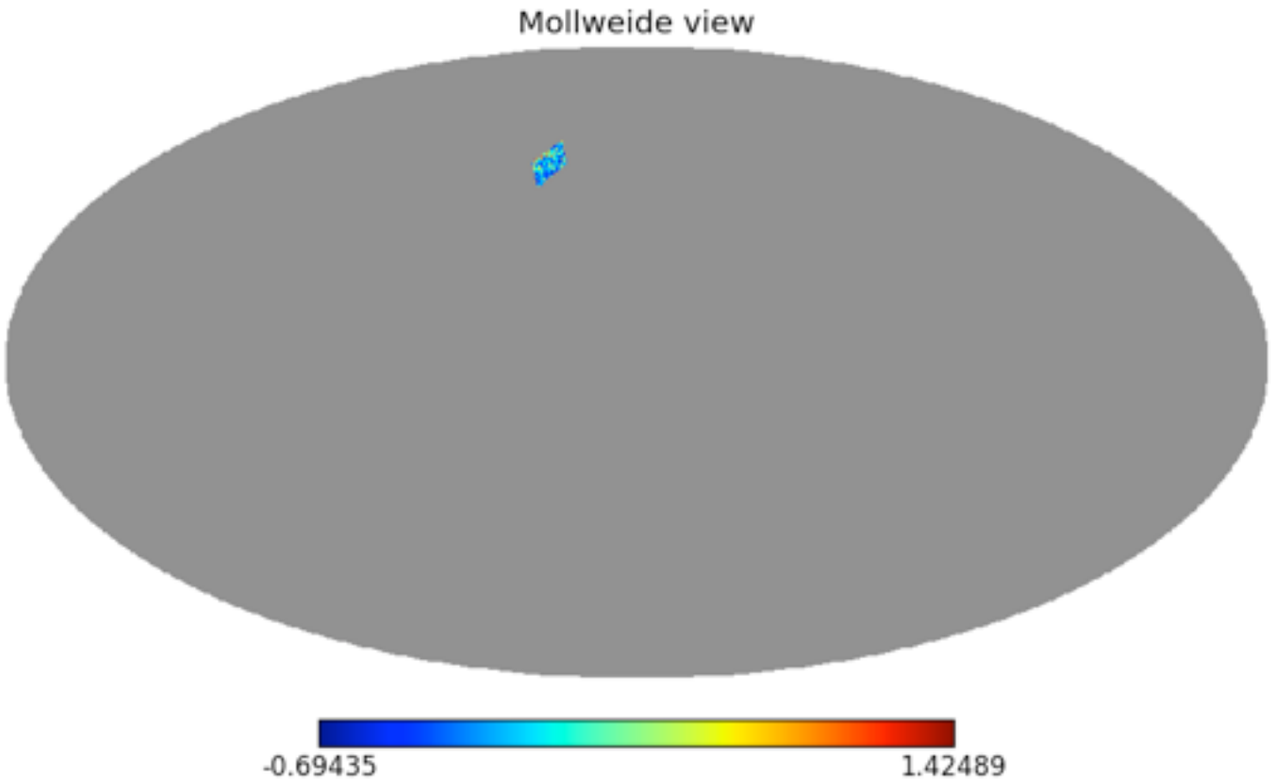
- Photo-z: Estimation of the galaxy redshift using different techniques.
- Usually one single statistical quantity to assign a redshift to each galaxy. Then we bin our photo-z bins in order to measure the angular clustering in each bin (and within bins).
- But we can use the full probability distribution function obtained using machine learning algorithms: MLZ, Skynet,

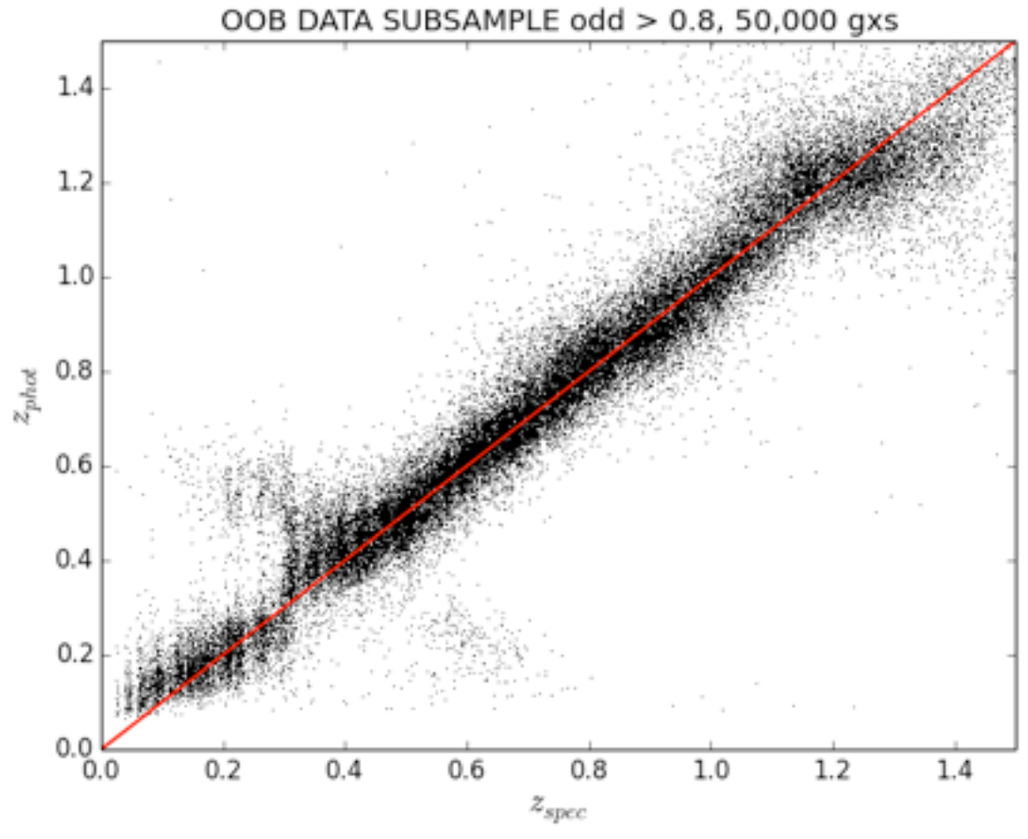
Example: This galaxy is in the z-shell 0.6<z<0.8 but the mean and the mode are assign to z-shell 0.6<z<0.8. Using the pdf information, we can assign some weight to the proper bin, recovering part of the lost information.



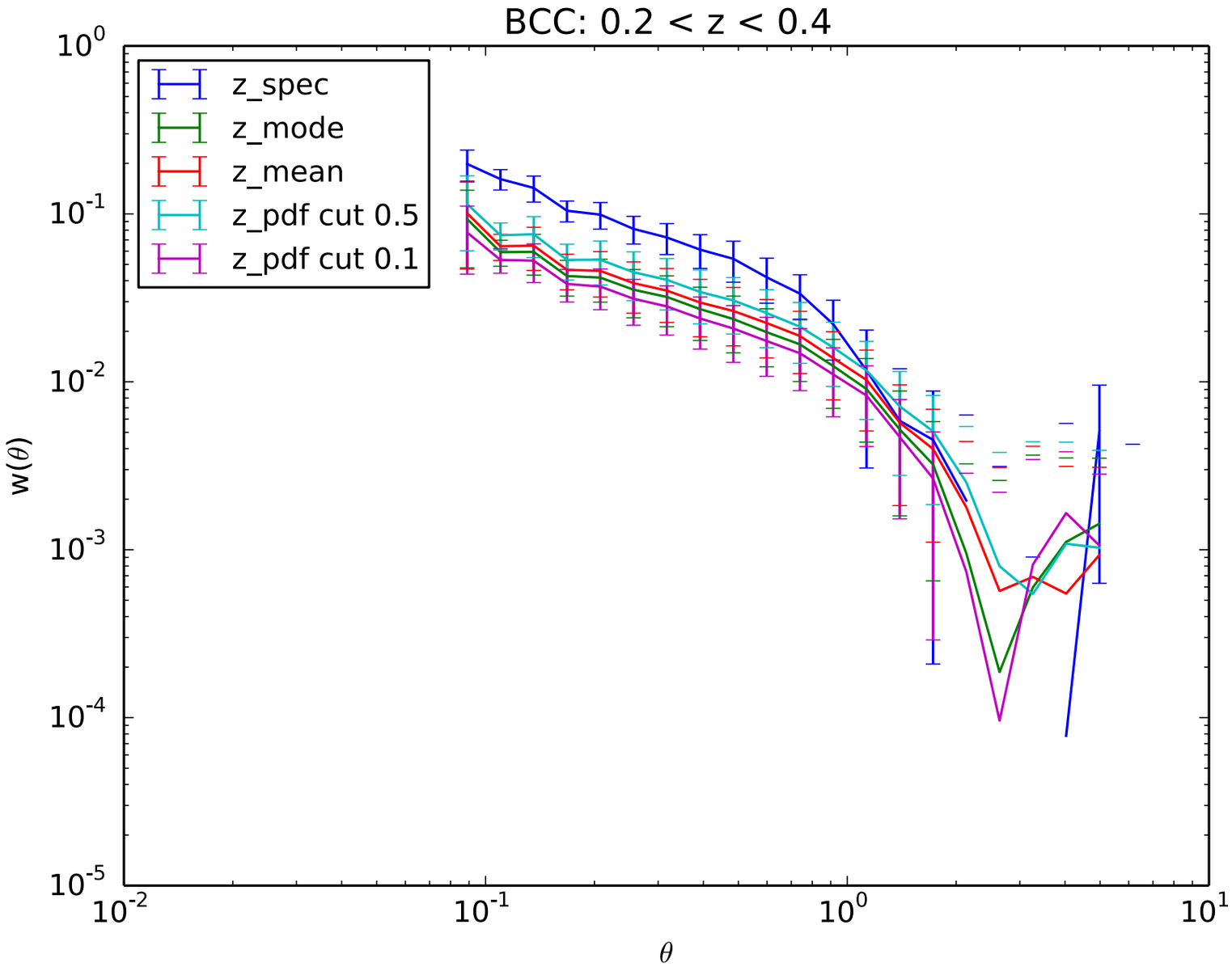
Methodology

- Using BCC Aardvark 1.0.
- Run MLZ on a pixel from the Aardvark simulation (done by Matias Carrasco-Kind) after training the code with the simulation. The considered area is about 50 sq. deg.
- Measure angular correlations with the different photo-z quantities.

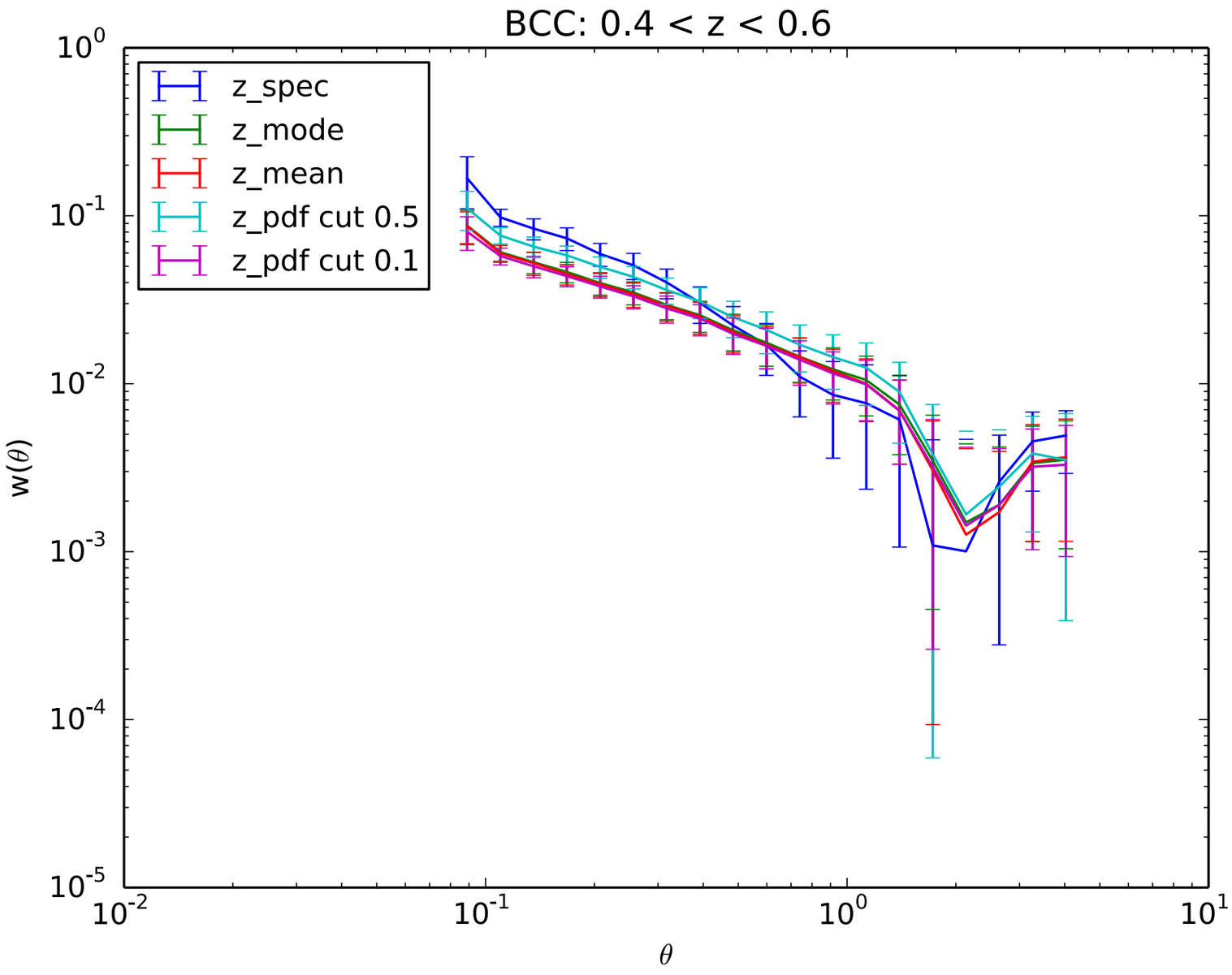




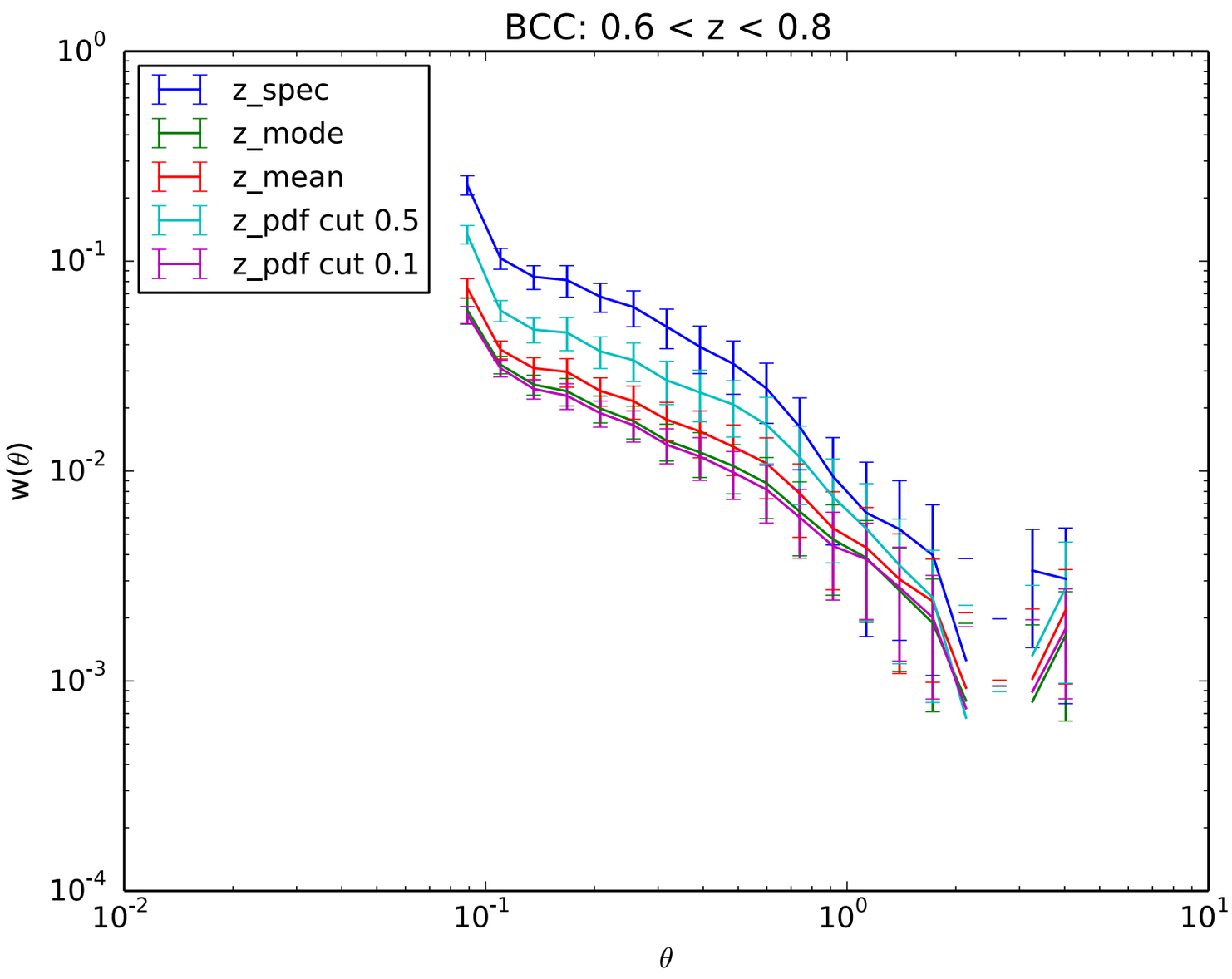
Redshift bin: 0.2 < z <0.4



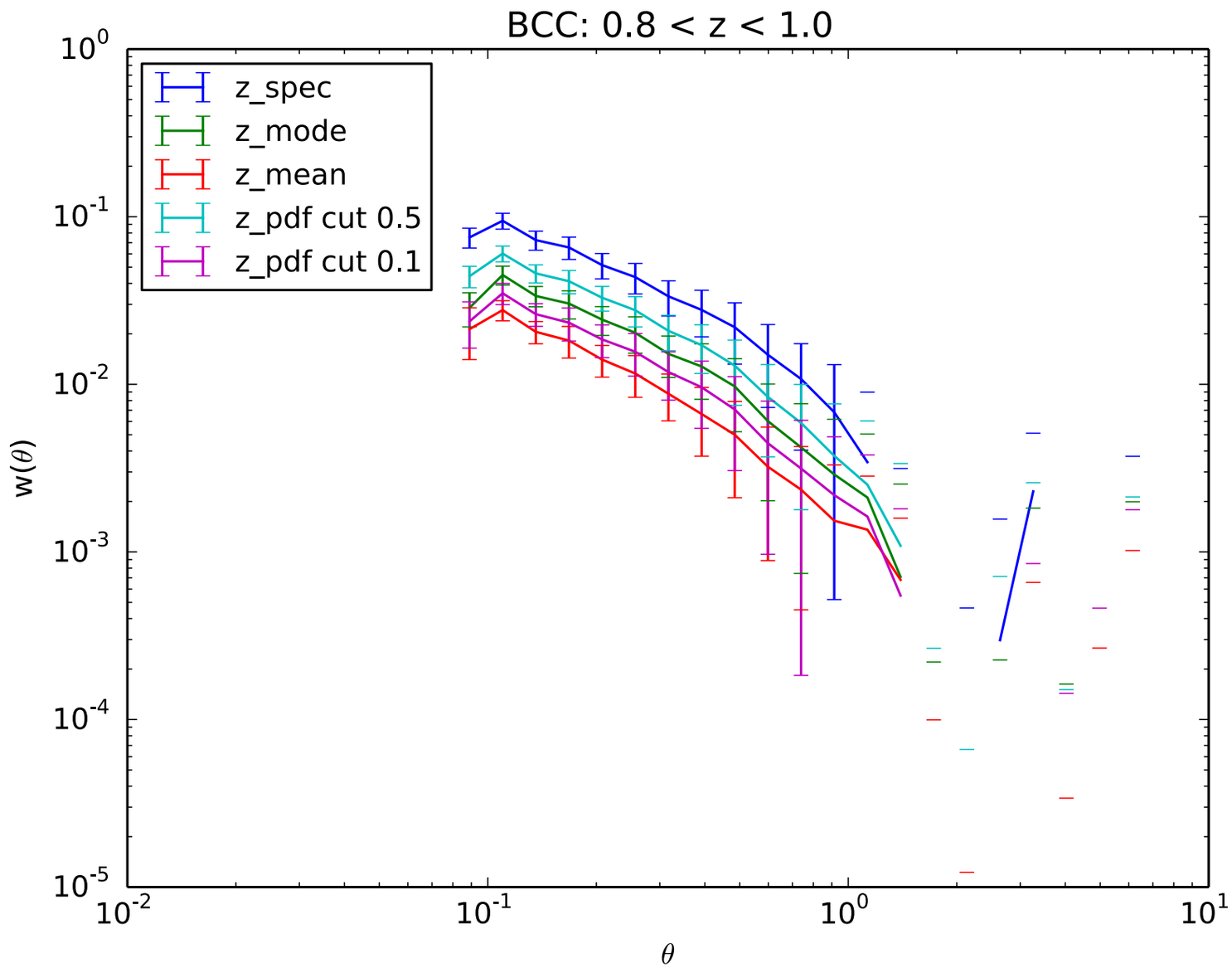
Redshift bin: 0.4 < z <0.6



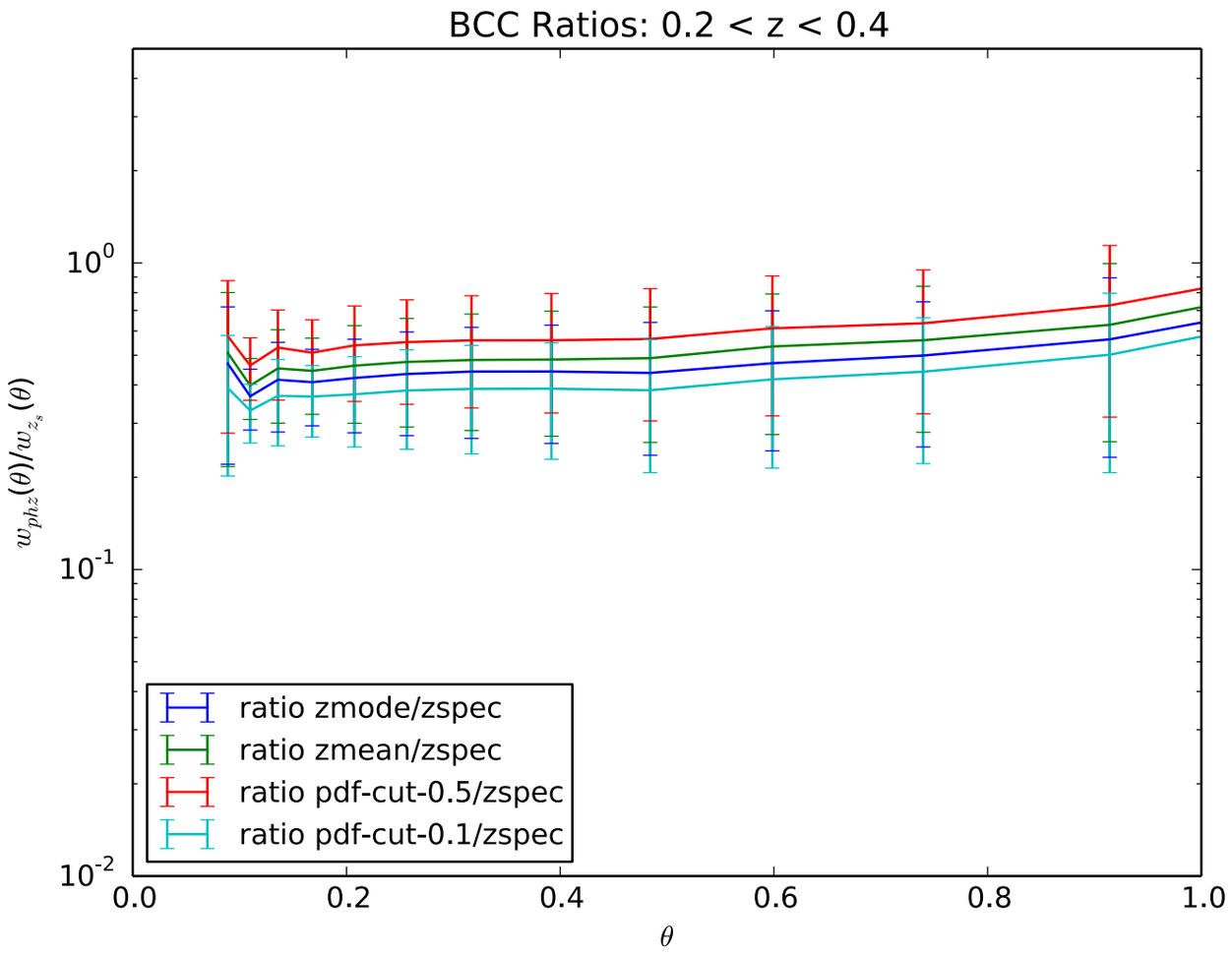
Redshift bin: 0.6 < z <0.8

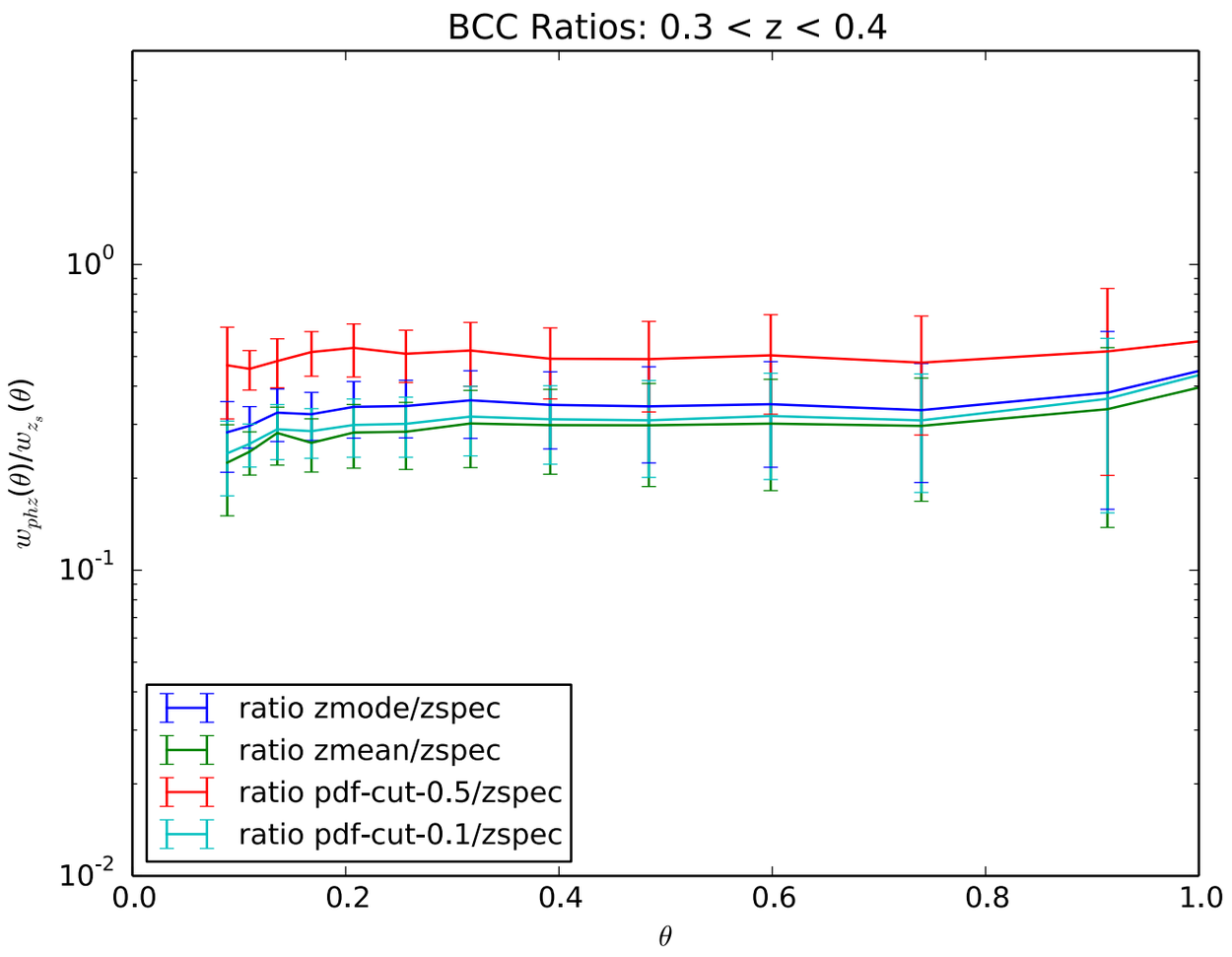


Redshift bin: 0.8 < z <1.0

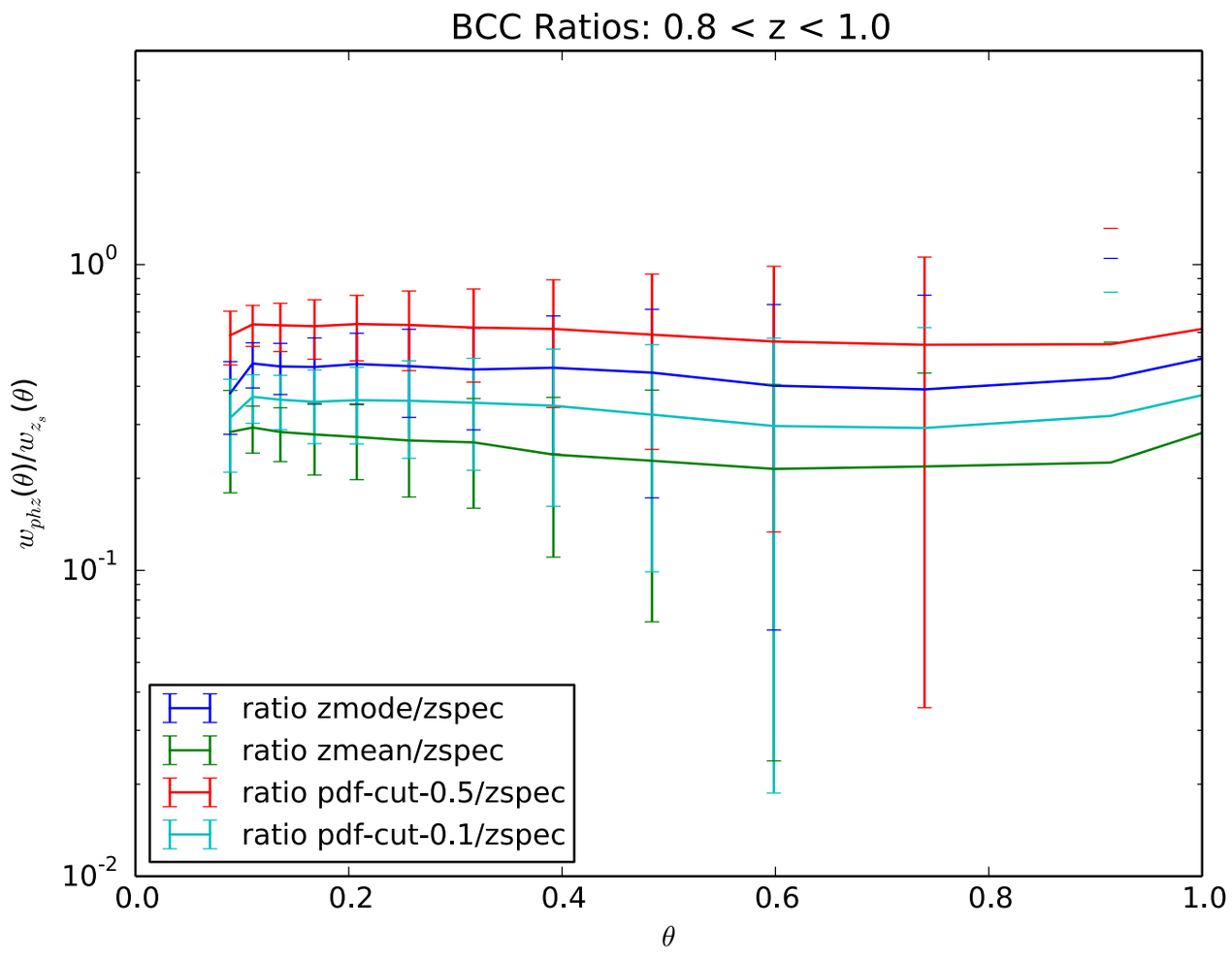


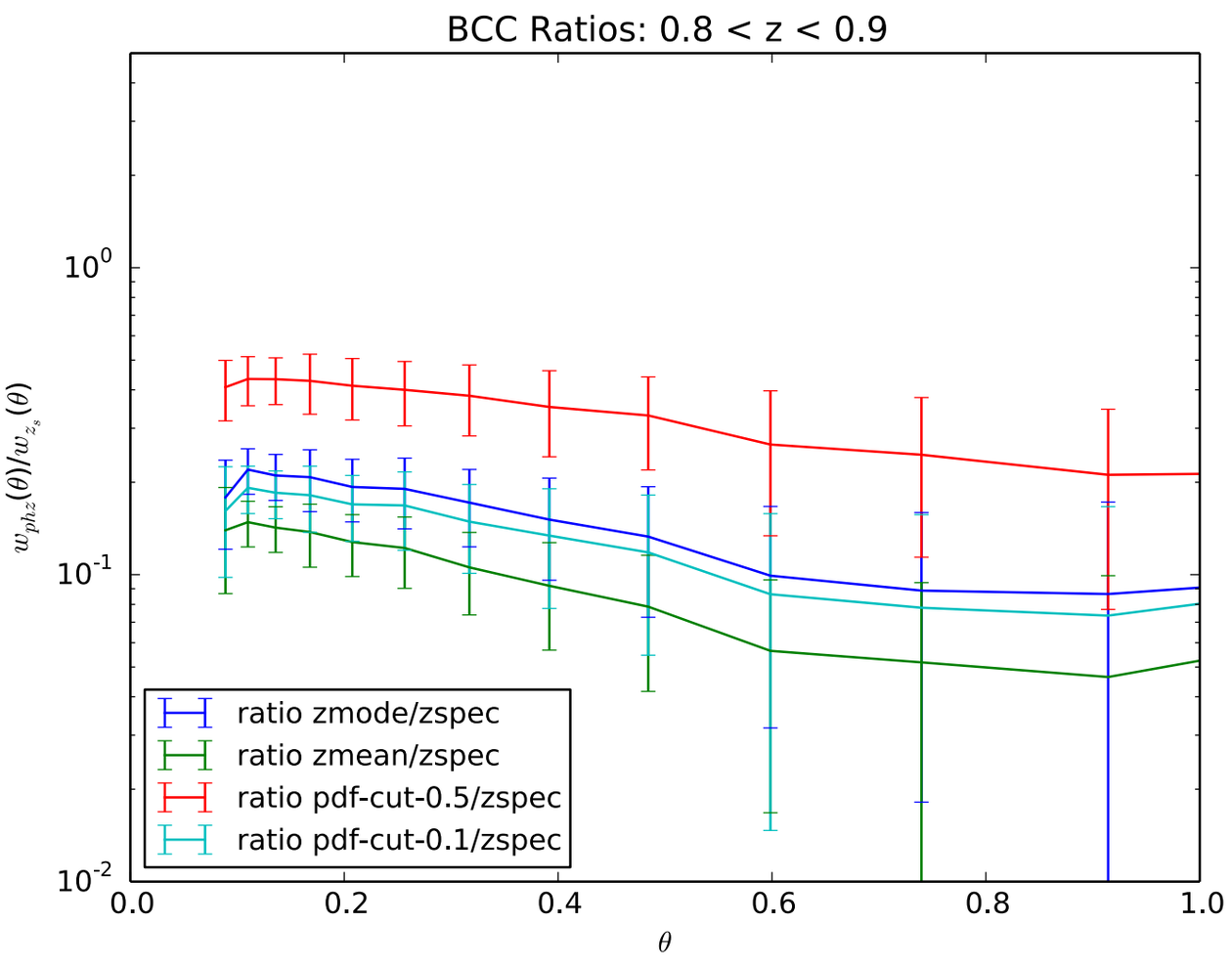
Narrow vs broad bins (lower z):





Narrower vs broader bins (higher z):





Conclusions

- We select galaxies in different redshift bins according to summary statistics like the mean or the best-fit value. We can use the full p.d.f. information instead.

- We see a clustering dependence on the clustering with the selected photo-z statistical criteria.

- Using p.d.f with proper cuts may improve the photometric clustering information.

- **Work in progress**: Bigger simulation areas and DES data.