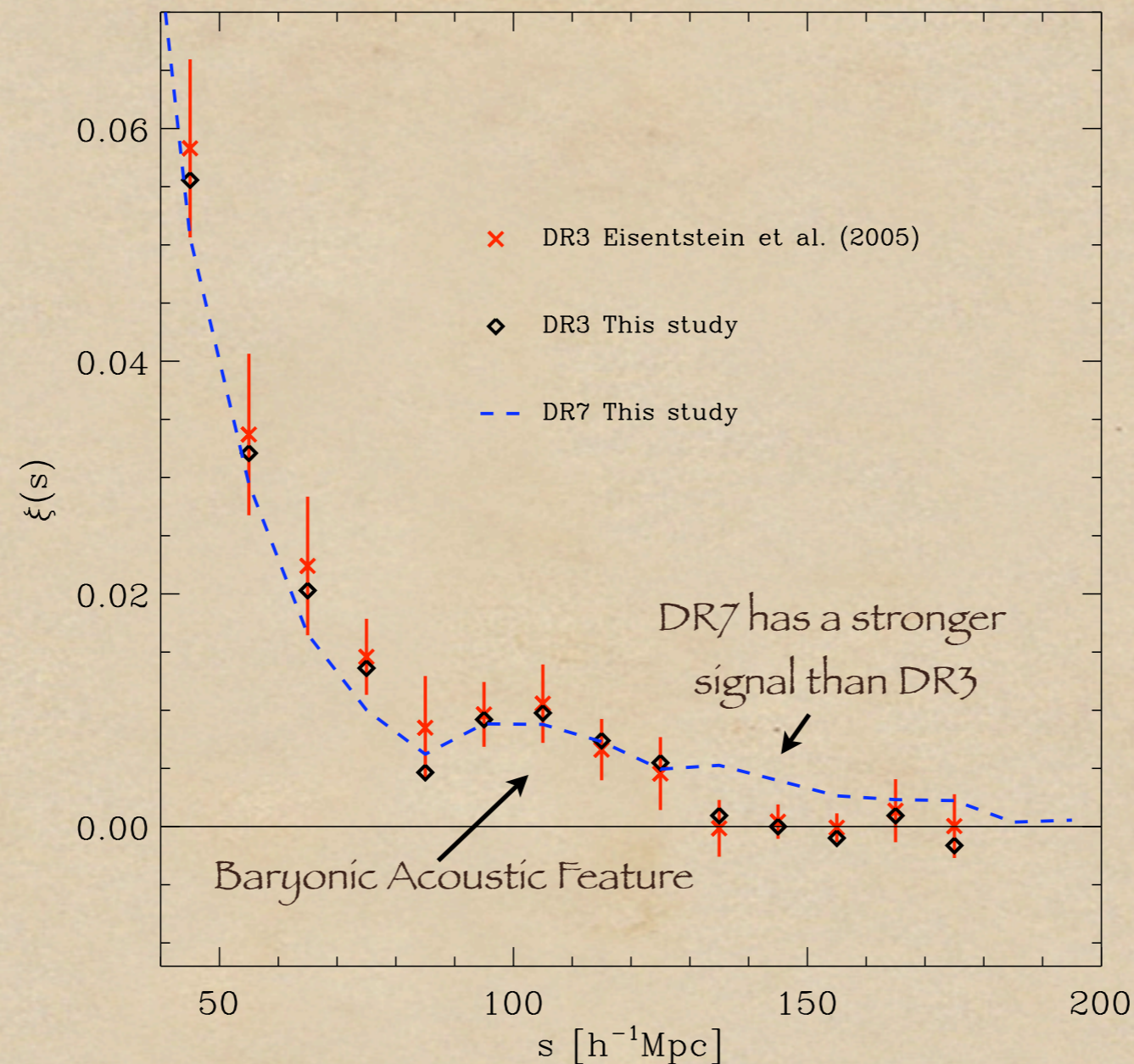


Large-scale clustering in the SDSS LRG sample

$$N_{\text{gal}}(r) = n_{\text{gal}} 4\pi r^2 dr (1 + \xi(r))$$

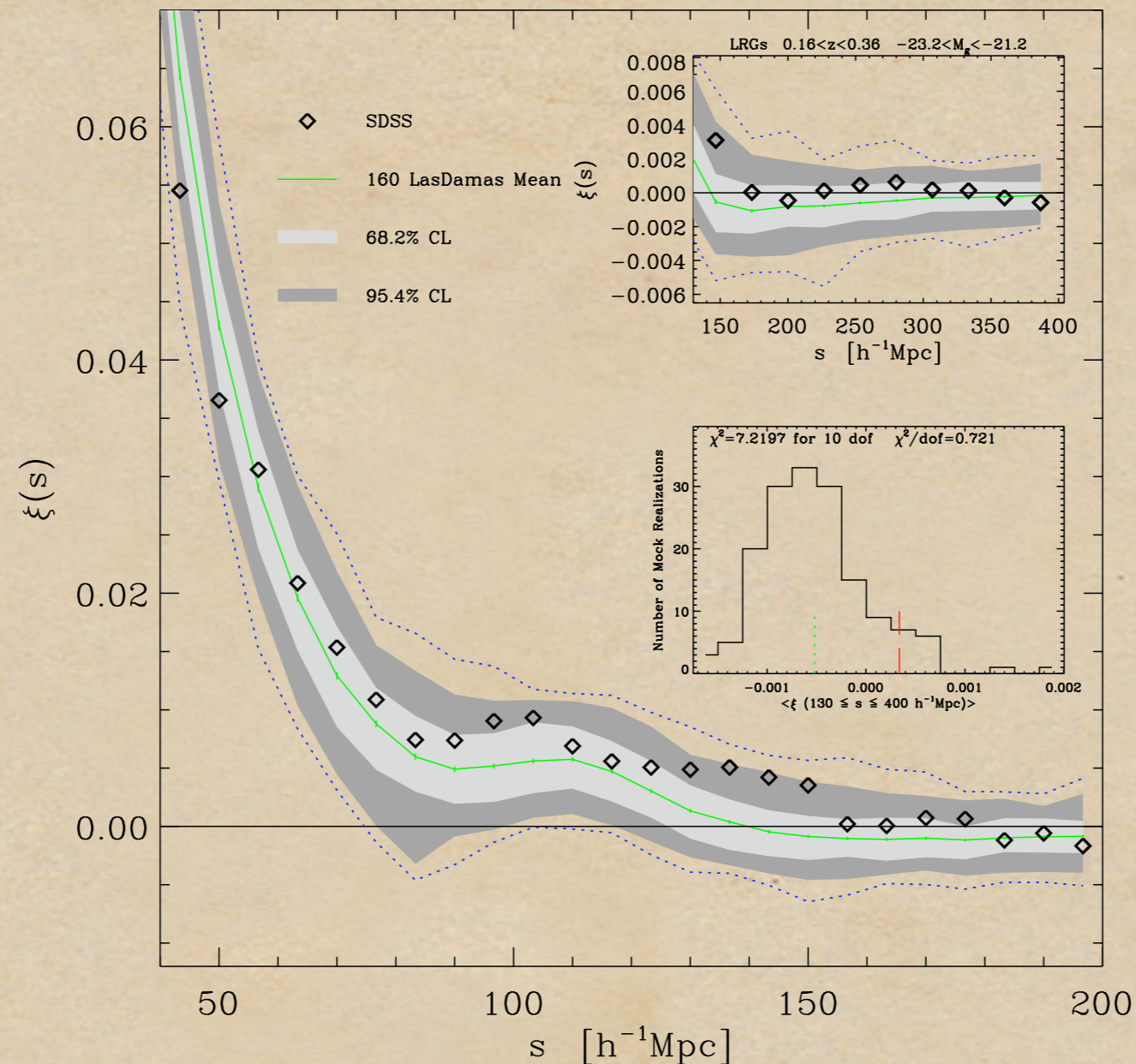
$\xi > 0$ Over-density
 $\xi < 0$ Under-density



- Differences in large-scale signal between data sets *are not* due to known data analysis systematics.



Large-scale clustering and Λ CDM

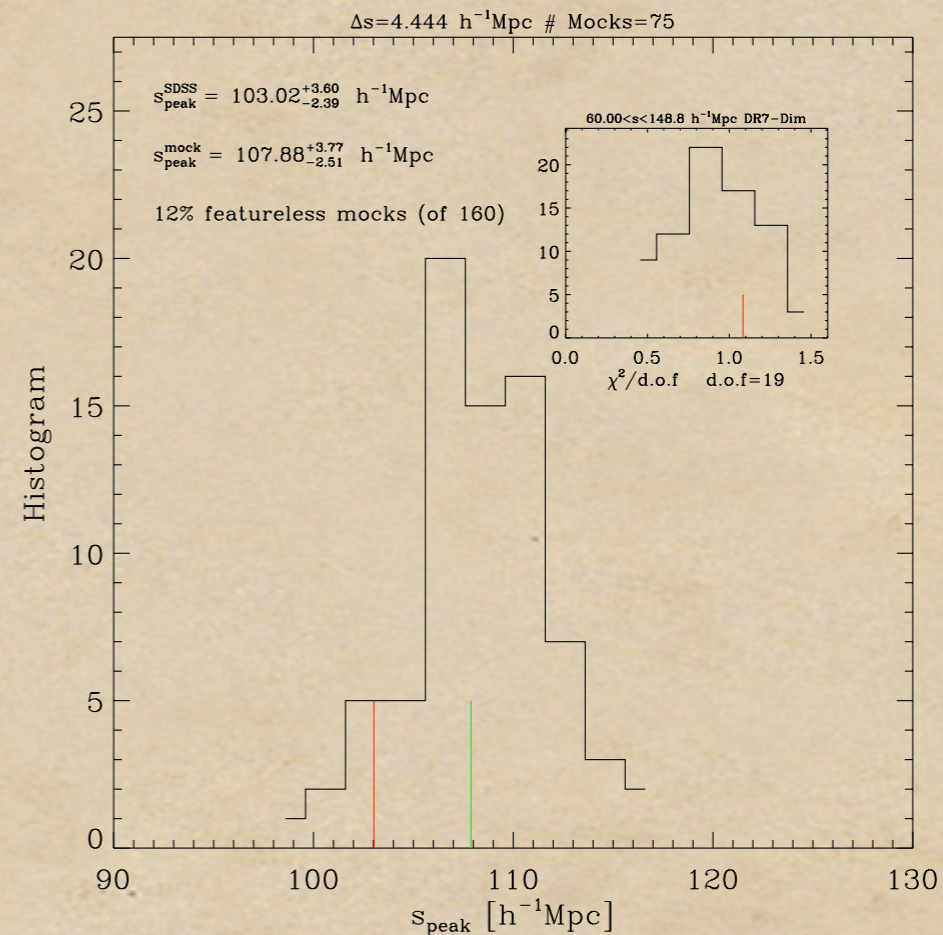
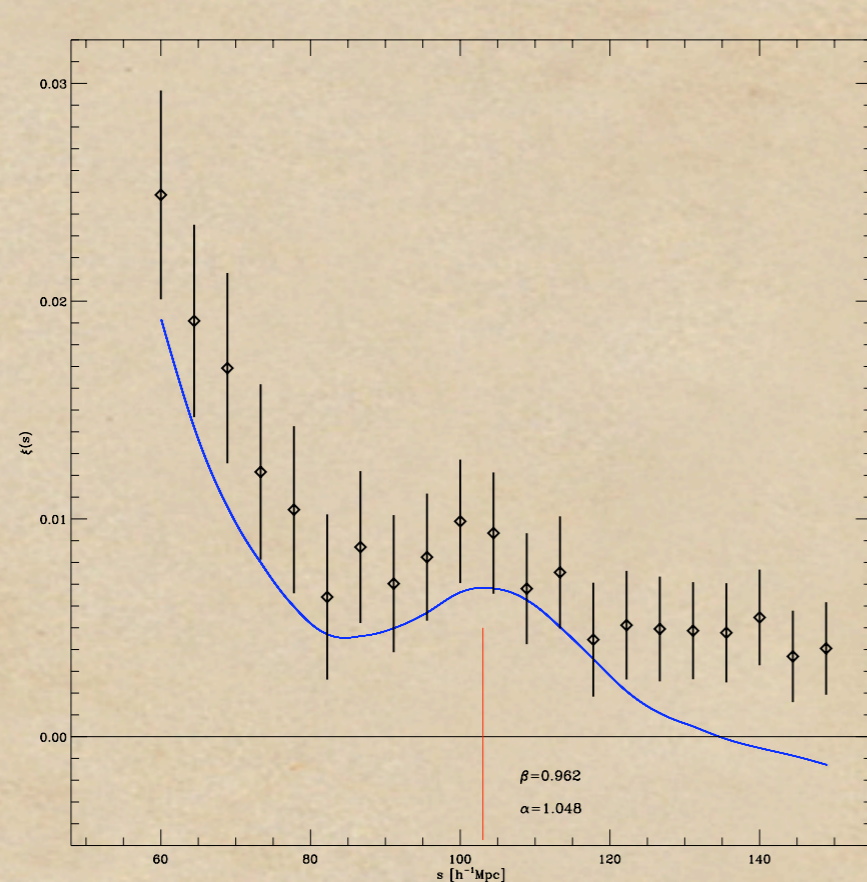


- Large-scale clustering signal is consistent with Λ CDM within 1.5σ .
- Differences between DR3 and DR7 are consistent with sample variance.
- Significant Baryonic Acoustic peak detected.

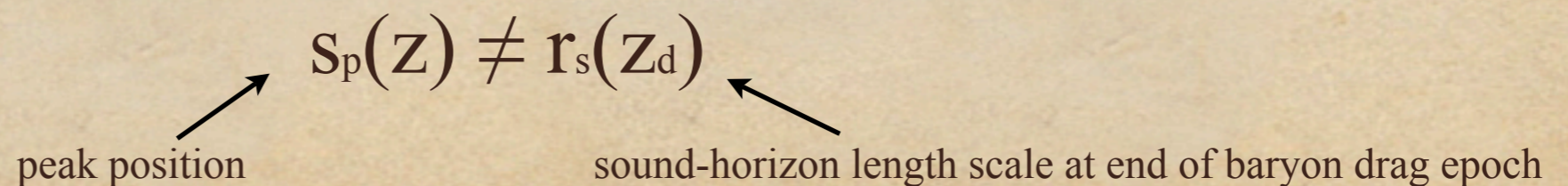


The Baryonic Acoustic Peak Position

$$\xi^{\text{model}}(s) = \beta \xi^{\text{mock}}(\alpha s)$$



- Peak position measured at $s_p = 103.0 \pm 3.5 \text{ h}^{-1} \text{Mpc}$ at $z = 0.277$.
- Baryonic Acoustic Feature is stable within most SDSS subsamples.
- 12% of mock SDSS volume galaxy realizations show *no sign* of a peak (mocks tested: LasDamas, Horizon-Run)



Baryonic Acoustic Peak as a Standard Ruler

S_p : ξ peak position

$r_s(z_d)$: Sound-horizon length scale

z_d : End of baryon drag epoch

D_V : Effective distance

D_A : Angular distance (not comoving)

H : Hubble expansion rate

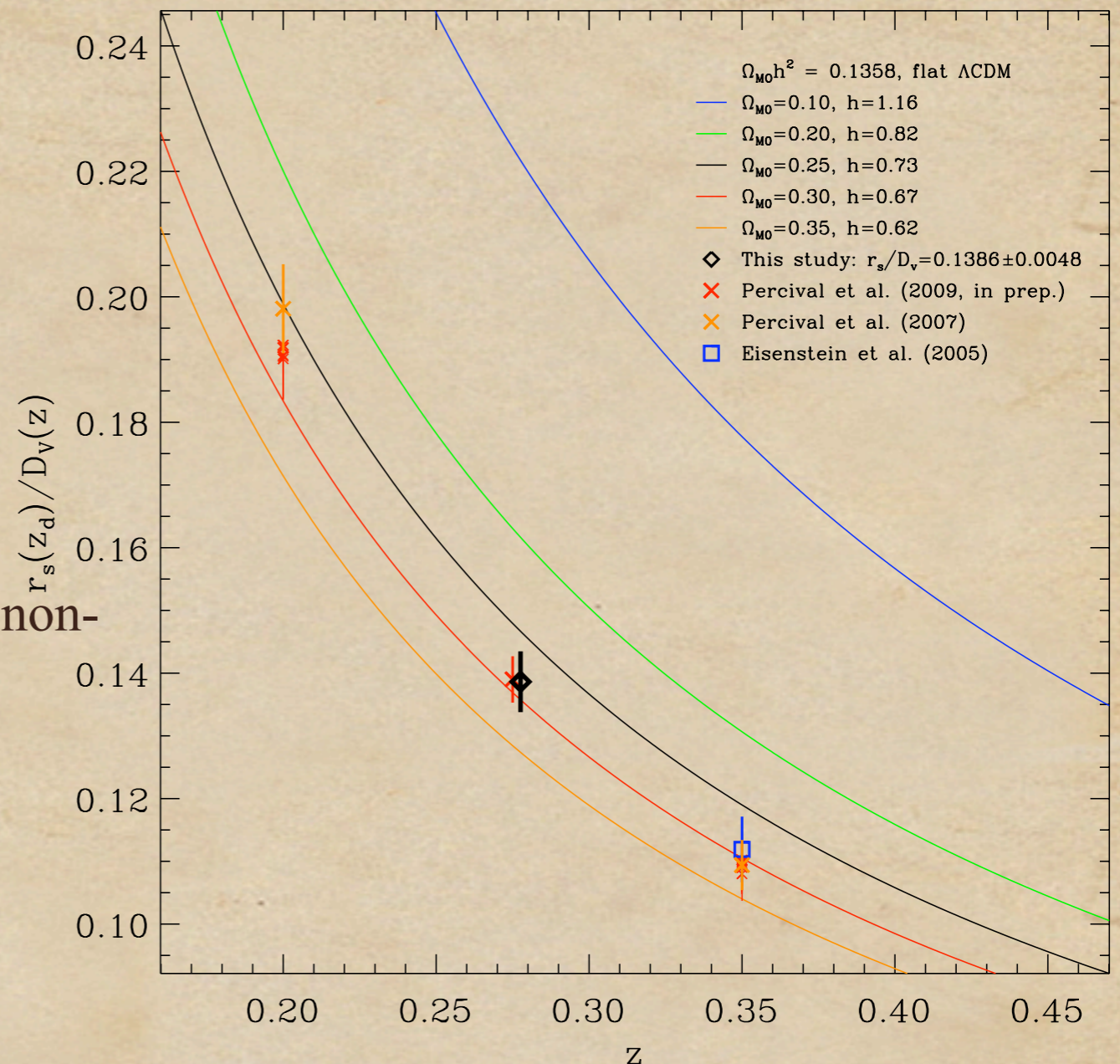
γ : correction term for observer effects, non-linear clustering, galaxy to matter bias

$$D_V \equiv \left[(1+z)^2 D_A^2 cz/H \right]^{1/3}$$

$$r_s = \gamma S_p$$

$$D_V^{\text{True}} = D_V^{\text{fid}} \left(\frac{r_s}{S_p} \right)^{\text{True}} \left(\frac{S_p}{r_s} \right)^{\text{fid}}$$

- Distance Ratio $r_s(z_d)/D_V(z)=0.139 \pm 0.005 h^{-1} \text{Mpc}$ (3.5%) at $z=0.277$.
- Assuming $r_s(z_d) = 153.3 \text{ Mpc}$ (WMAP5) : $D_V(0.277) = 1106 \pm 39 \text{ Mpc}$
- Similar result obtained independently by Percival et al. (2009; in prep.)



- Results will be published in Kazin et. al (2009; in prep)

In collaboration with:

Michael Blanton

‘All astronomers do these days is count photons, galaxies and citations’ -MRB

and:

LasDamas (McBride et al 2009; in prep) :

Cameron McBride

Andreas Berlind

Roman Scoccimarro

<http://lss.phy.vanderbilt.edu/lasdamas/>

- Further Study: SDSS LRG Anisotropic ξ
Constraining the squashing parameter (related to Ω_M)
Angular Baryonic Acoustic Feature

