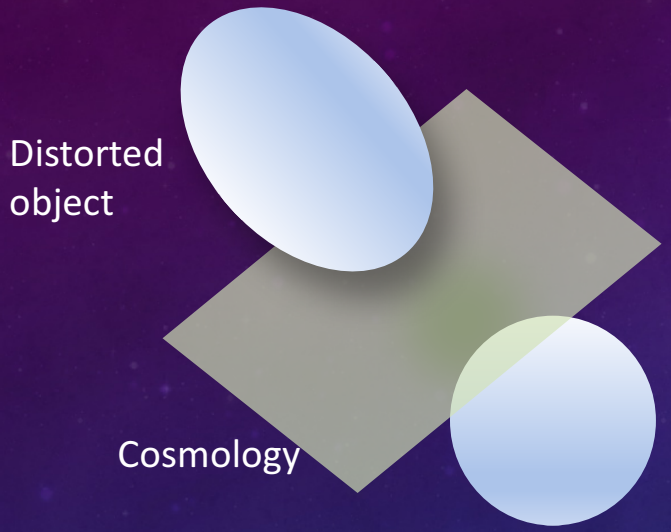
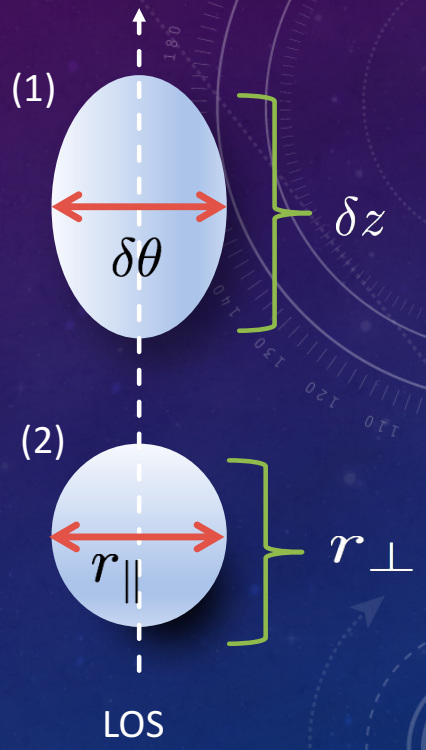
ALCOCK- PACZYNSKI TEST WITH COSMIC VOIDS : CURRENT STATUS

A GEOMETRICAL TEST.

ALCOCK – PACZYNSKI TEST :





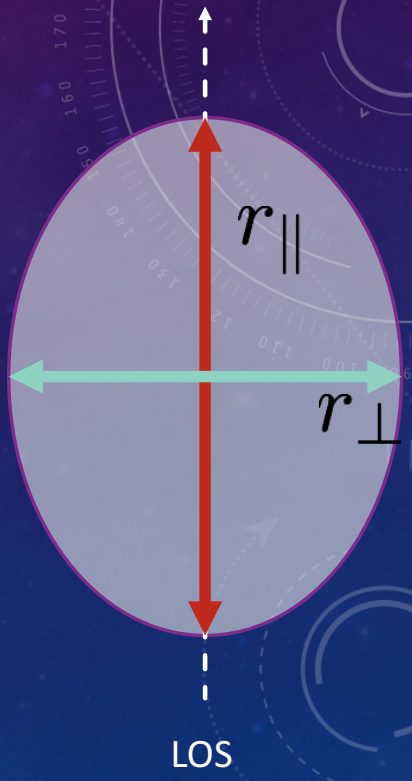
In an ideal world, the only thing causing a difference between both figures is the cosmology.

$$\frac{r_{\parallel}}{r_{\perp}} = \frac{\delta z}{\delta\theta}\frac{c}{D_A(z)H(z)}$$

AP TEST ON VOID – IN PRACTICE

- Voids are considered as most appropriate to apply this test. Indeed, they are expected to be spherical in **average, as the Universe is expected to be homogeneous and isotropic.**
- In practice, voids are stacked and aligned along a same line of sight (LOS) in order to extract their **average** information.
- The AP test consists in measuring the extent of the stack sample along the LOS and in the perpendicular direction to the LOS, as:

$$\frac{r_{\parallel}}{r_{\perp}} = \frac{D_A(z)^{true} H(z)^{true}}{D_A(z)^{fid} H(z)^{fid}}$$



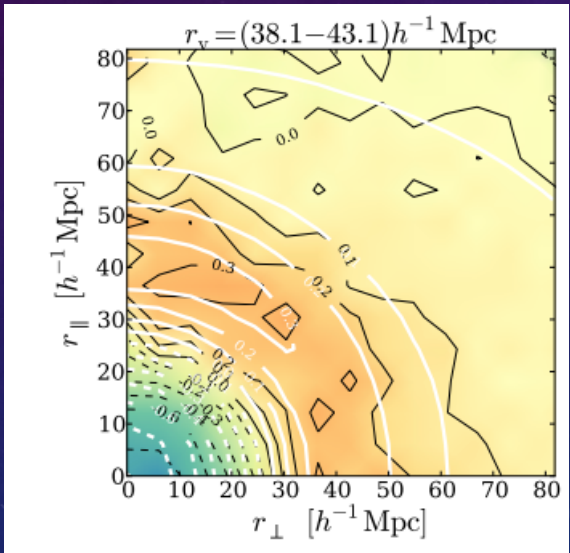
MEASURING THE EXTENT

There are two ways, as of now, to measure the extent of the stacks :

Measure the Galaxy-Void cross-correlation function $\xi(\sigma,\pi)$.

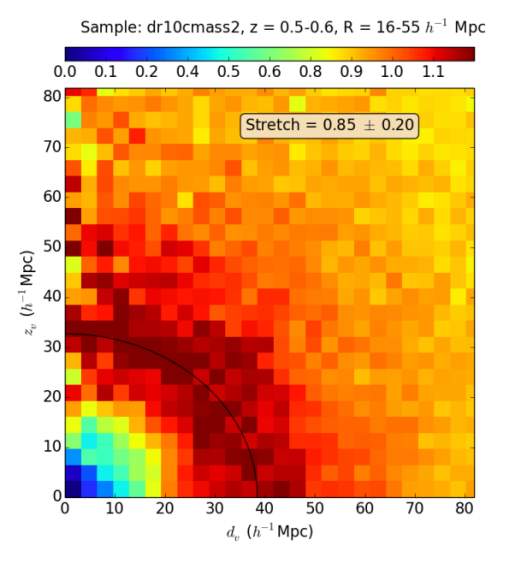
Measure the inertia of the stack of the void, projected in 2D :

$$\epsilon = \sqrt{\frac{2\sum z_i}{\sum d_i}}$$



Hamaus et al. 2016

Which is actually highly correlated to the method used to stack



Sutter et al. 2014

COMBINATION WITH OTHER PROBES

- Future prospects will concern potentially stringent constraints if combined with CMB/BAO/SNIa, and how to do this within Class/Camel framework?