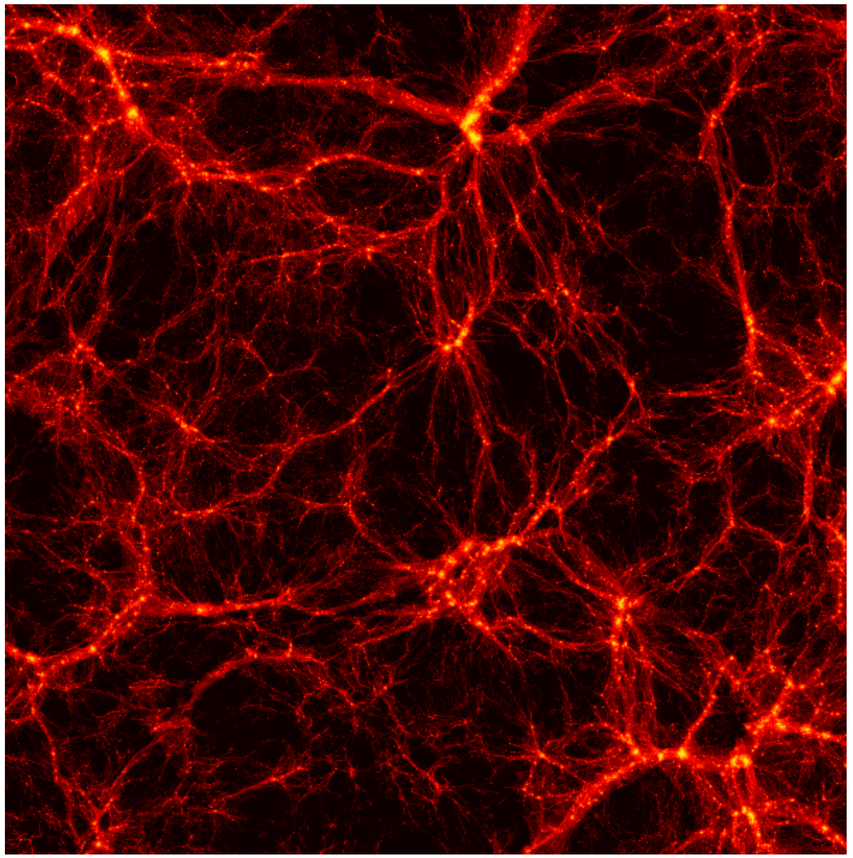
Probing Large Scale Structure with angular density and redshift fluctuations

PHD student Mar Pérez Sar
Supervised by Carlos H. Monteagudo
András Kovács

PID2022-142142NB-I00

Probing LSS with angular density and redshift fluctuations

Large Scale Structure (LSS)



QUIJOTE simulations : Francisco Villaescusa Navarro

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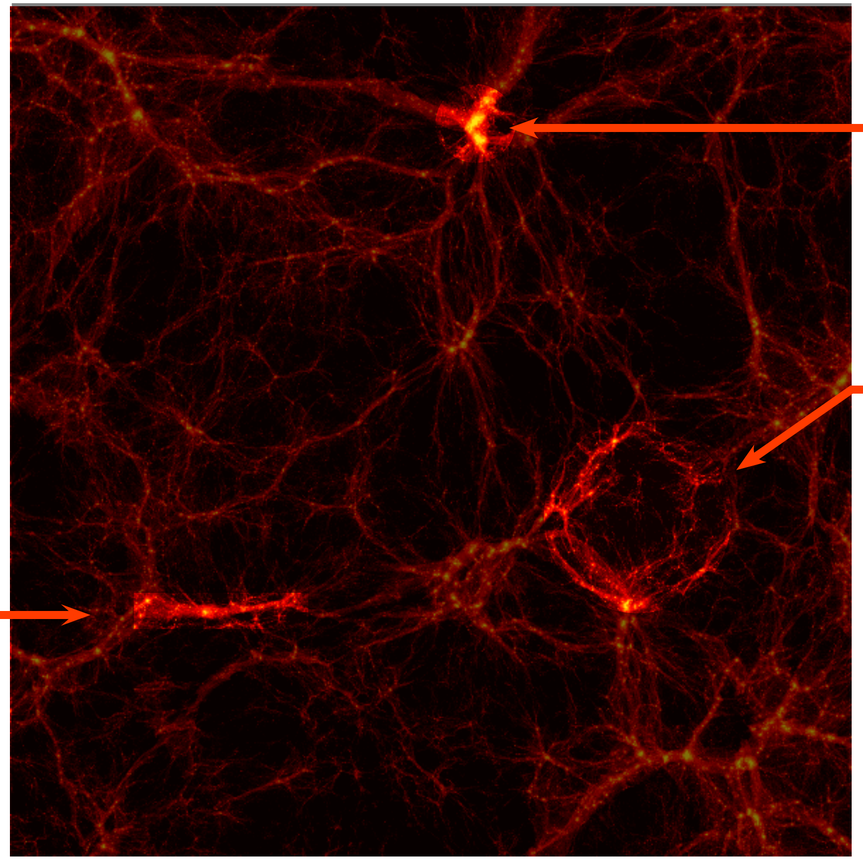

Clusters

Voids

Filaments

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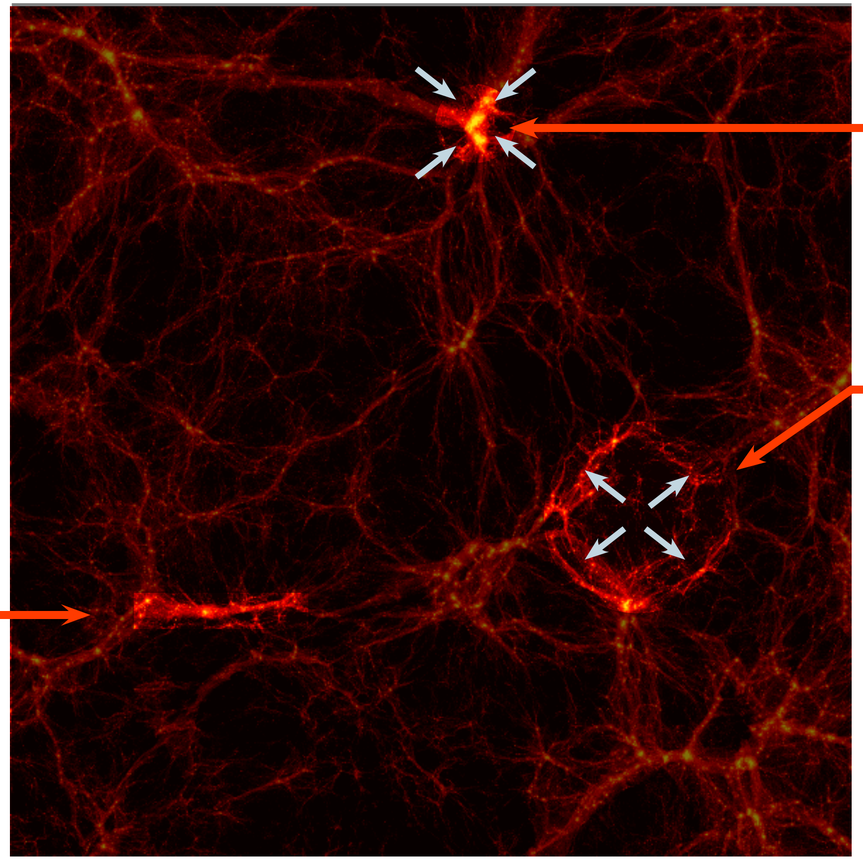

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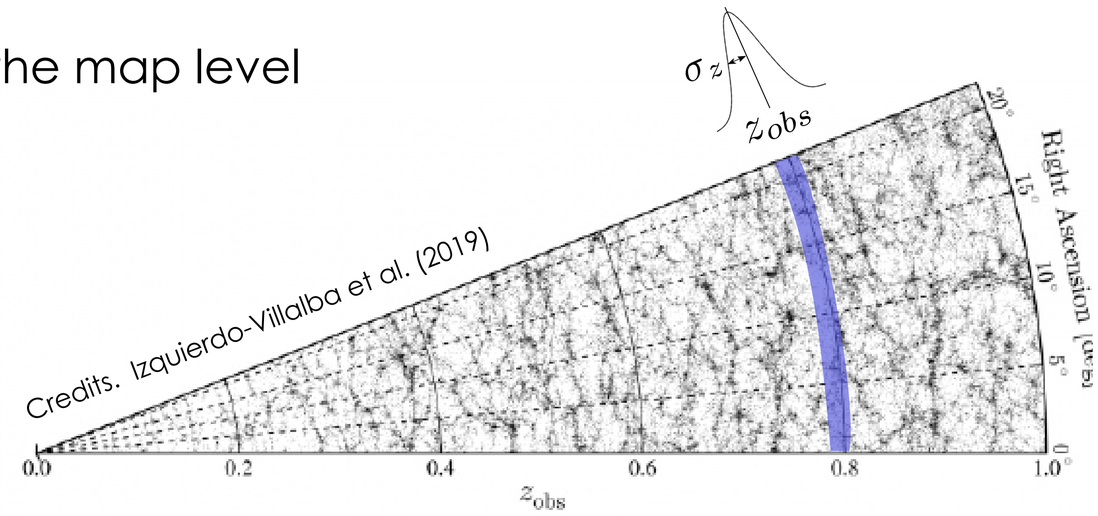
DENSITY — Angular Density Fluctuations

$$\delta_g^{2D}(\hat{n}) = \frac{\sum\limits_{j\subseteq\hat{n}} W_j}{\langle \sum\limits_{j\subseteq\hat{n}} W_j \rangle} - 1 \qquad W_j = e^{-\frac{(z_{obs}-z_j)^2}{2\sigma_z^2}}$$

At the map level



DYNAMICS* — Angular Redshift Fluctuations

Carlos Hernández Monteagudo

$$\delta_z^{2D} = \frac{\sum\limits_{j\subseteq\hat{n}} W_j \cdot (z_j - \bar{z})}{\langle \sum\limits_{j\subseteq\hat{n}} W_j \rangle}$$

*density weighted by the redshift fluctuations**

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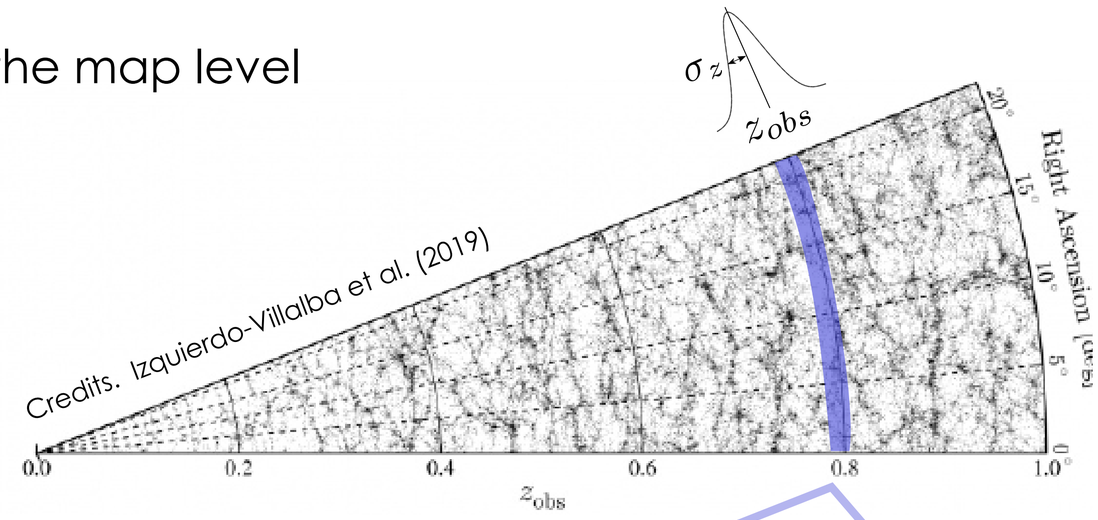
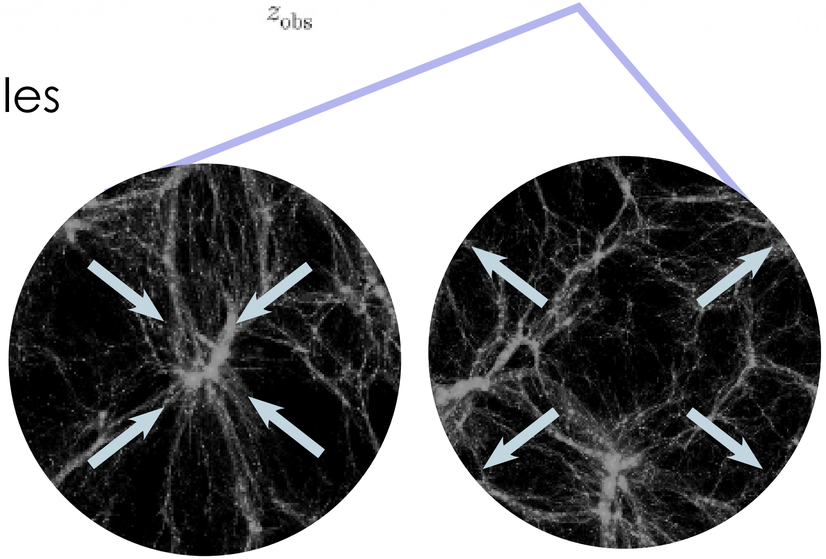


On smaller scales



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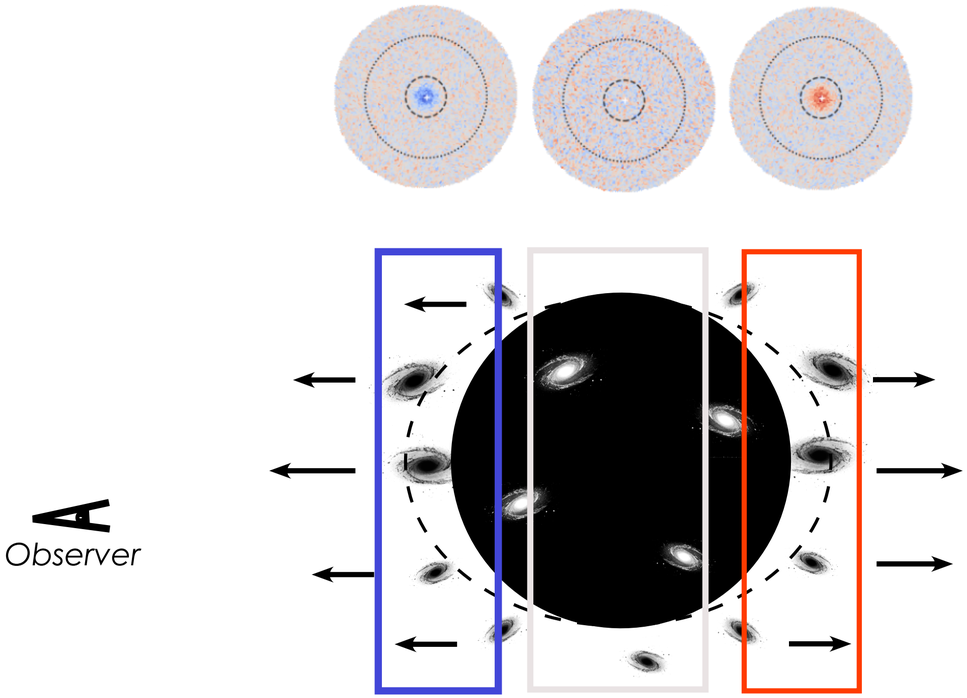
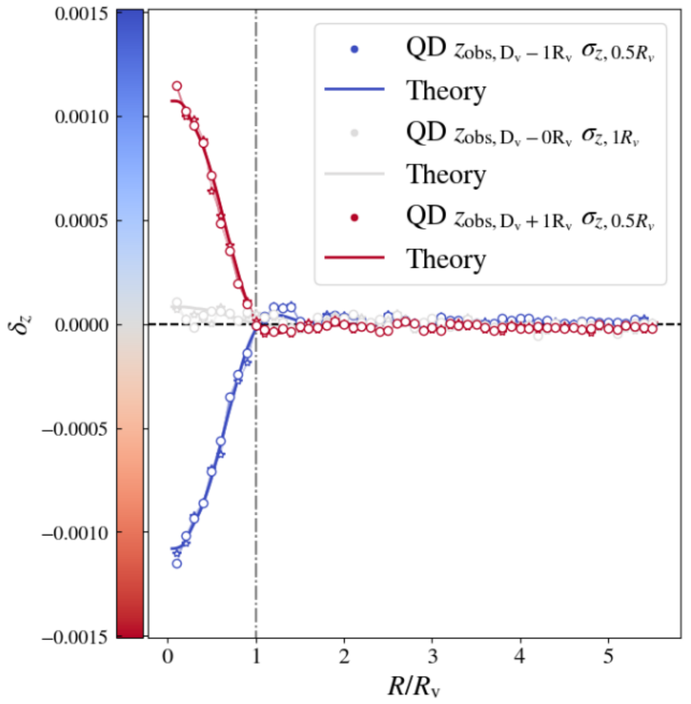
Probing LSS with angular density and redshift fluctuations

On smaller scales.
We stack ARF maps at void's position and measure the profiles.





VOID: Bulk flow of matter moving away from the center

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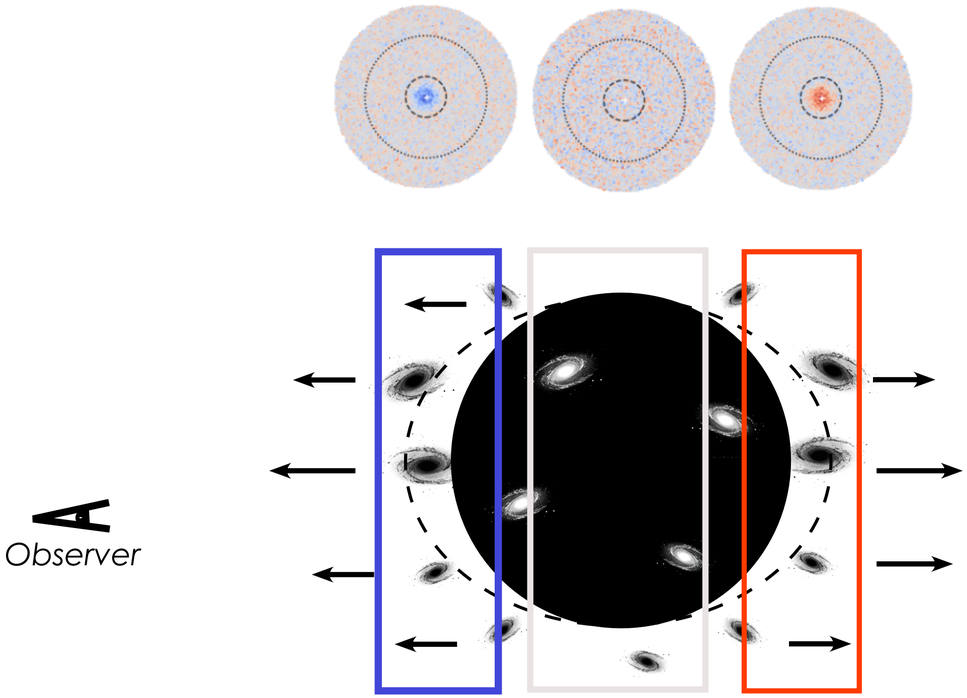
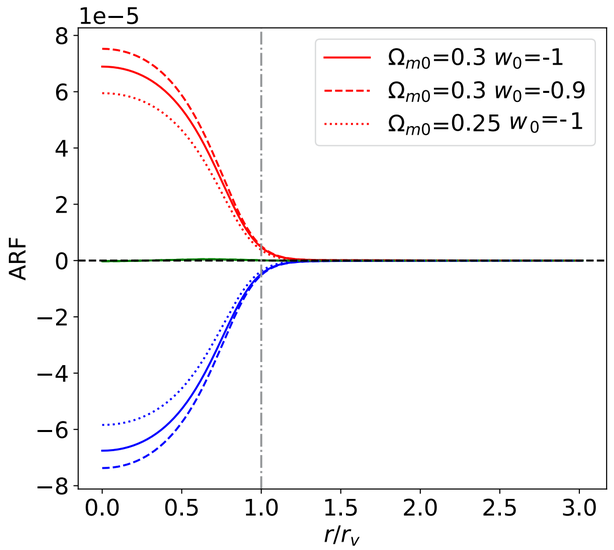


Sensitive to cosmology



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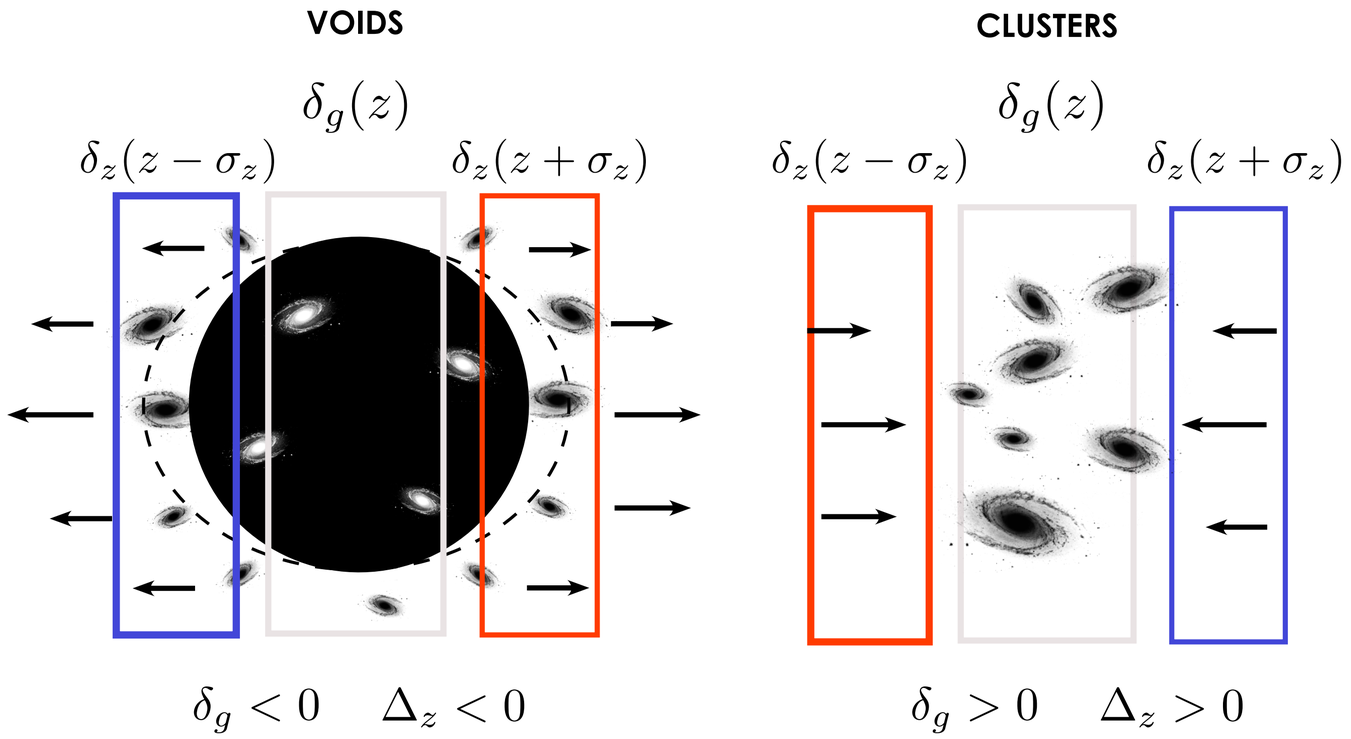
Probing LSS with angular density and redshift fluctuations

Learning from the smallest scales...

$\delta_g(z)$

$\Delta_z = \delta_z(z-\sigma_z) - \delta_z(z+\sigma_z)$

$\delta_g \times \Delta_z > 0$



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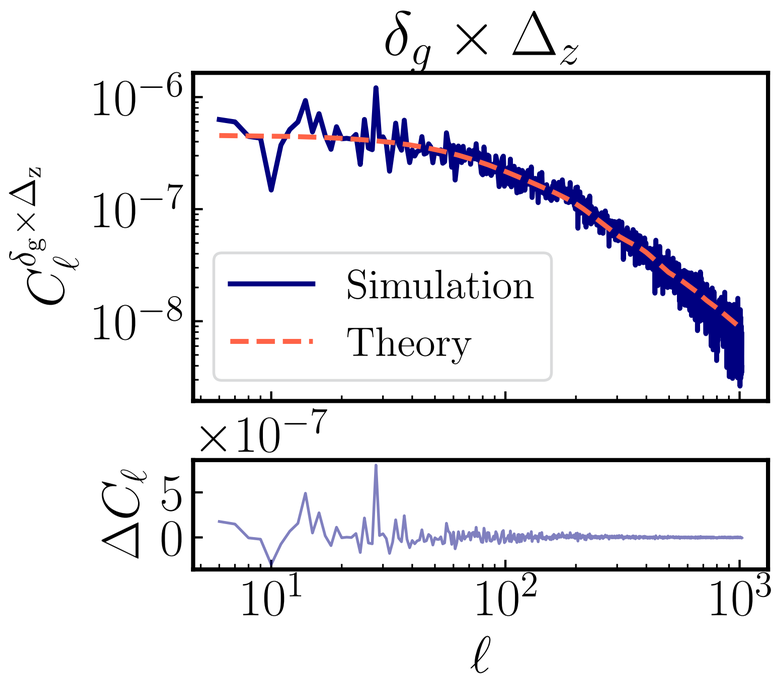
Probing LSS with angular density and redshift fluctuations

All scales.

First. We create maps of cross-correlations betwen angular density and redshift fluctuations.

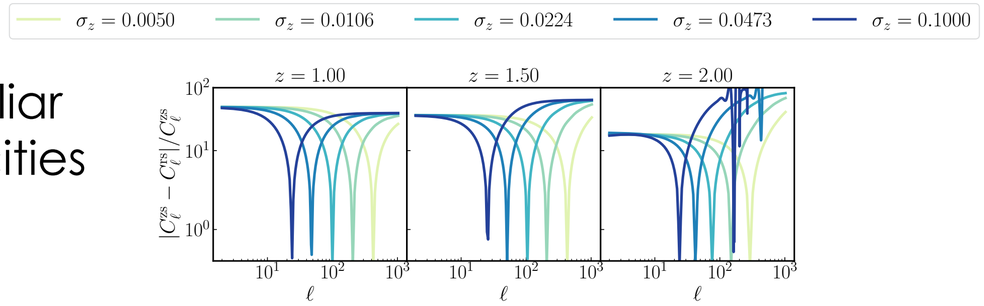
$$\delta_g \times \Delta_z = \delta_g(z) \times [\delta_z(z - \sigma_z) - \delta_z(z + \sigma_z)]$$

Second. **Measure the '*Cls*'** (correlation between the 2 fields at a given scale ***l***)

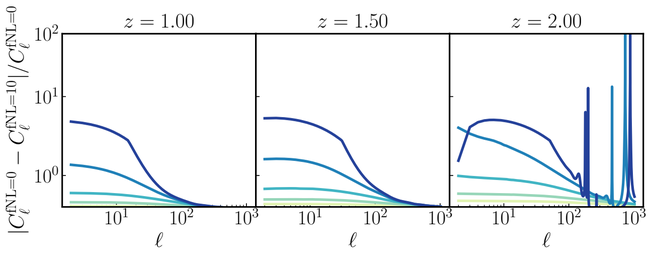


Sensitive to cosmology

peculiar velocities fσ$_8$



fNL



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