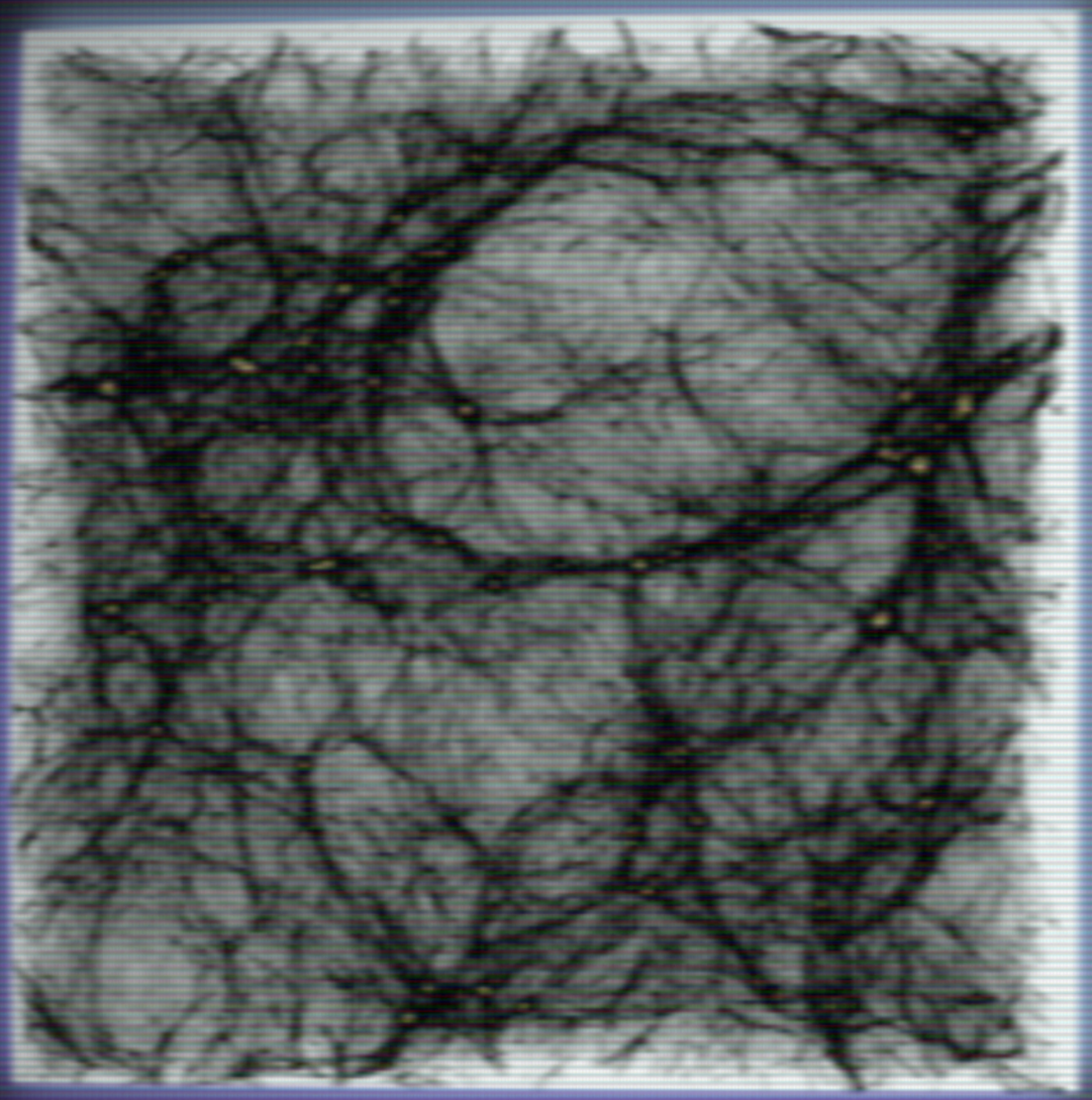
THE FULL-SKY SPHERICAL FOURIER-BESSEL POWER SPECTRUM ON THE LIGHTCONE

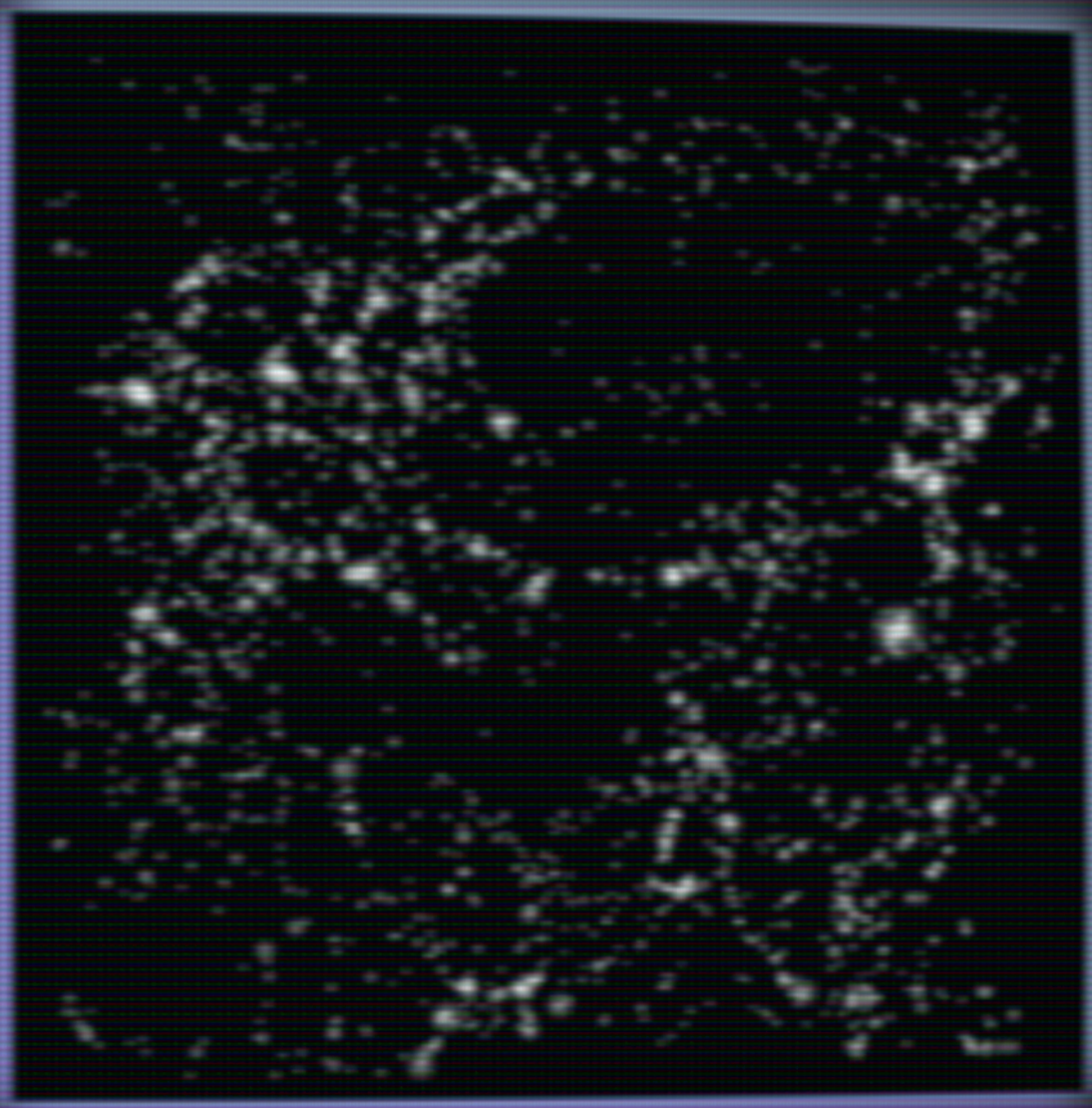
FEDERICO SEMENZATO

University of Padova

Collaborators ALVISE RACCANELLI
DANIELE BERTACCA



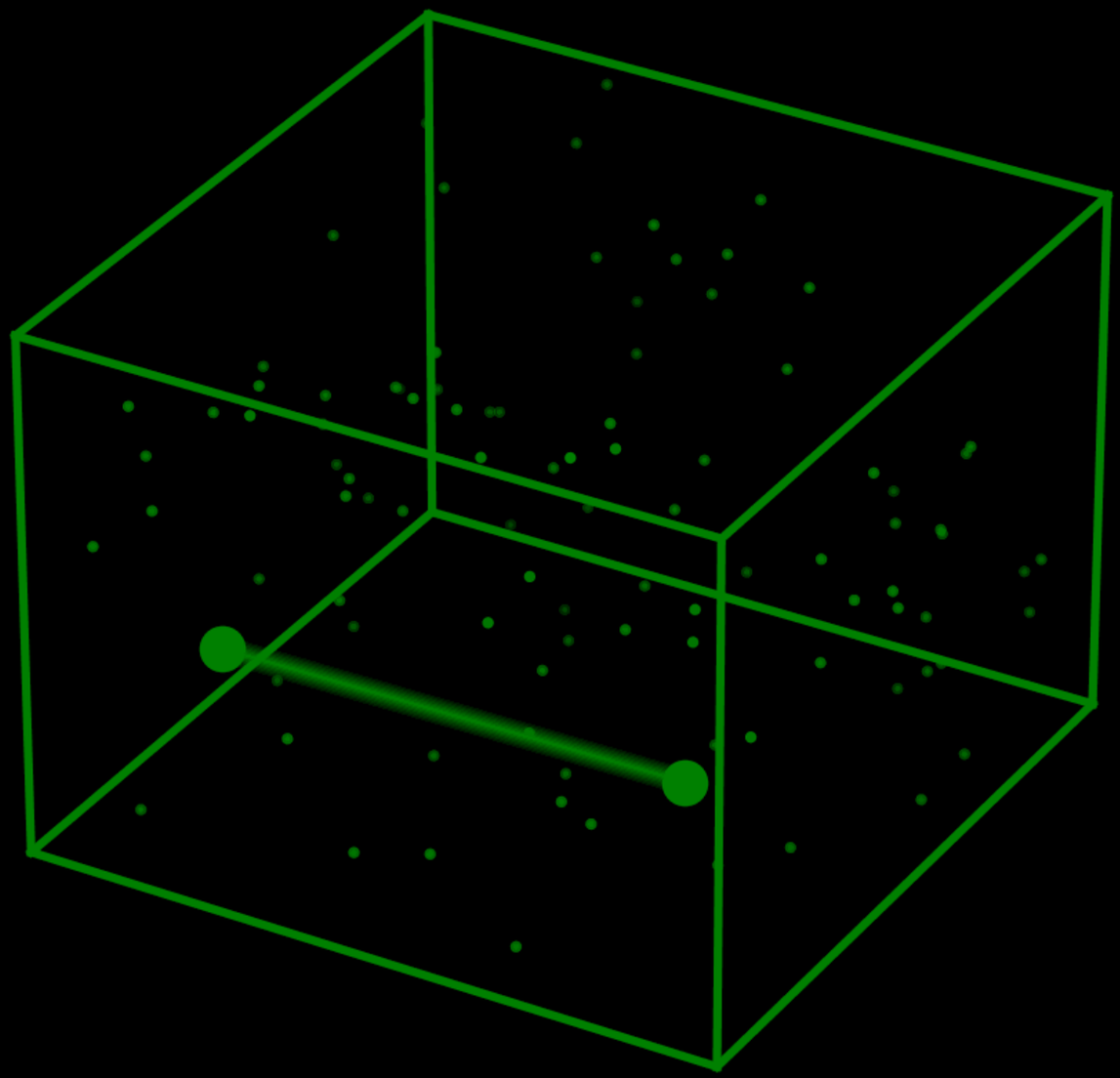
Dark matter



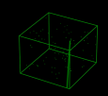
Galaxies

$$\delta_g \sim b\delta_m$$

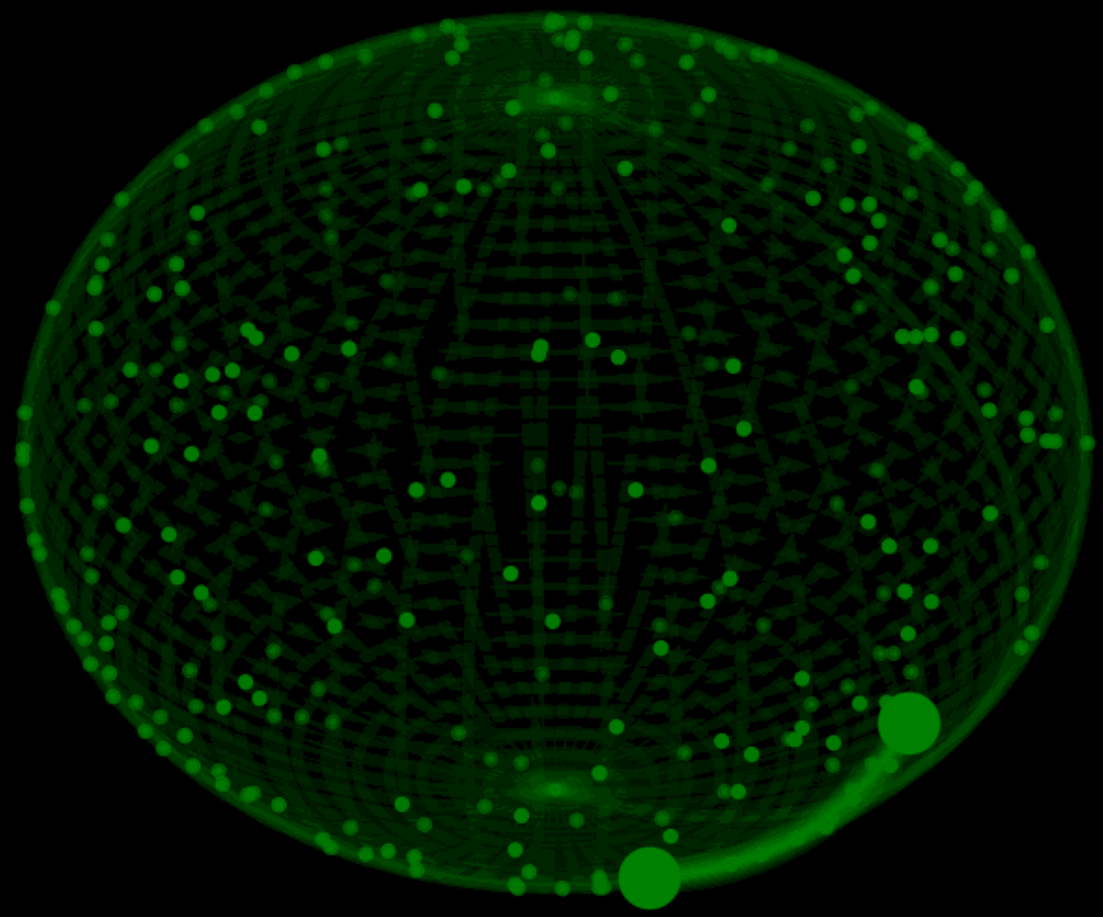
Biased tracer



Classical analysis

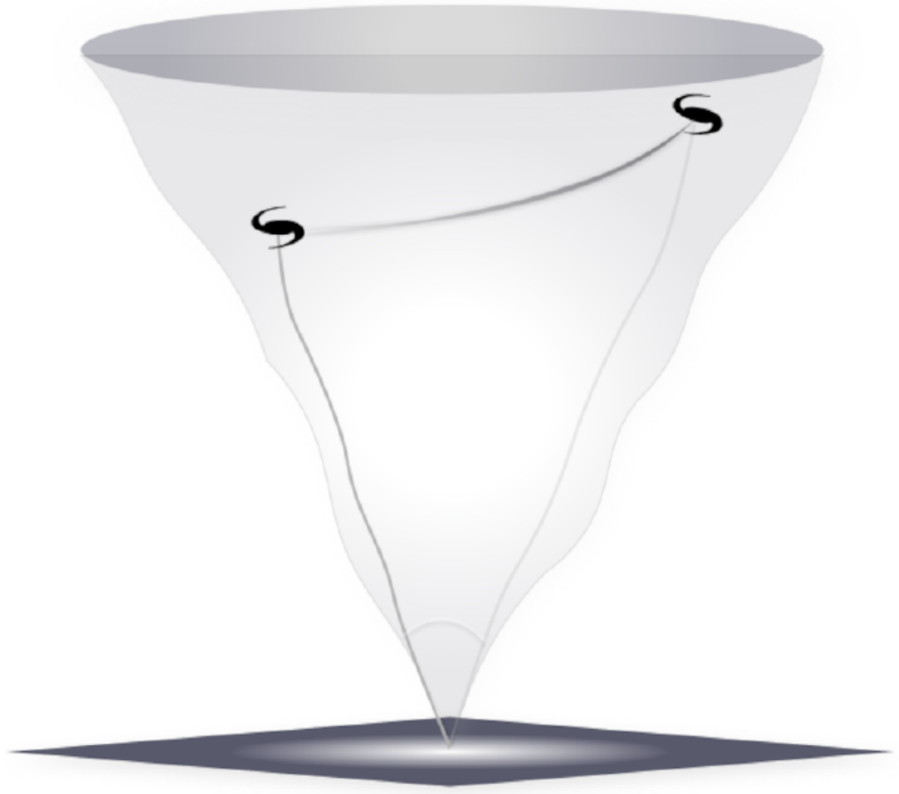


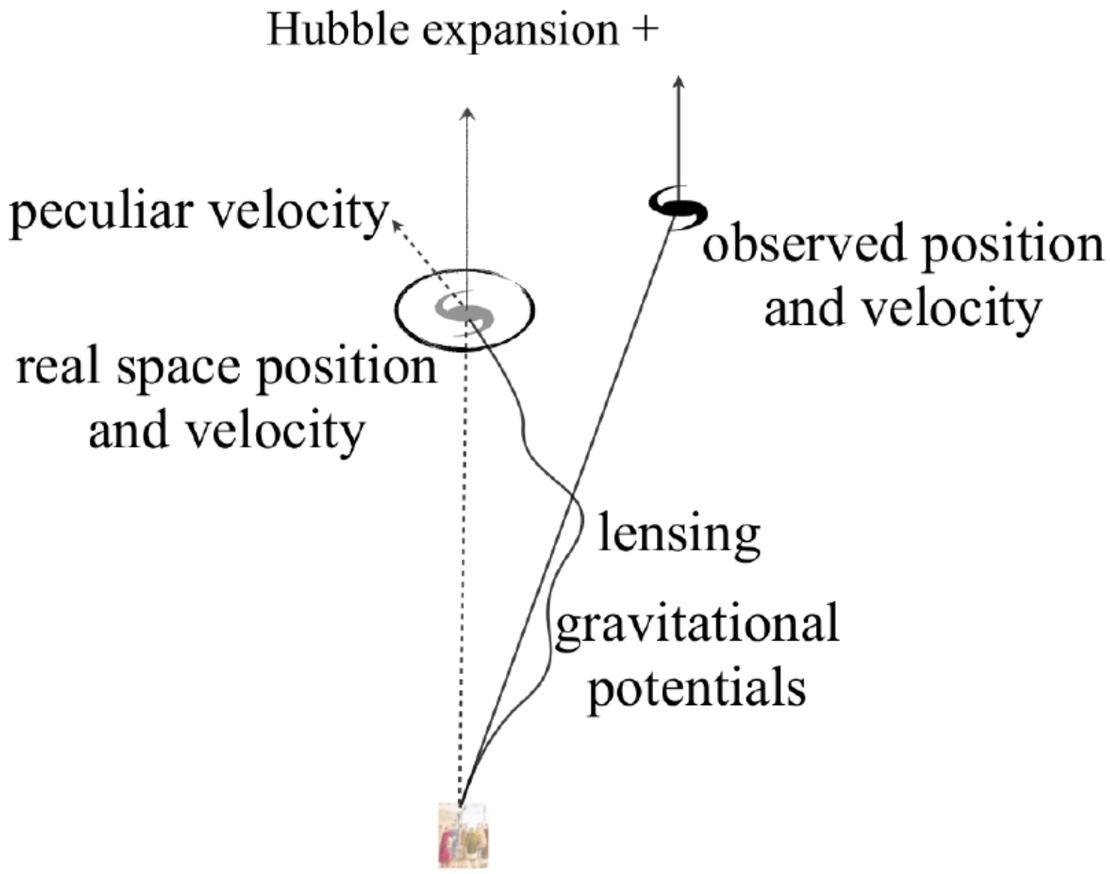
Classical analysis



Angular Correlations

GR Corrections





[*Courtesy of* Raccanelli et al. 2015]

[Jeong et al. 2011]
[Challinor&Lewis 2011]
[Bertacca et al. 2014]
[Raccanelli et al. 2015]

Impact on Forecasting & Data Analysis

Constraints on **early-Universe physics**

$$b(k,z) = b_G(z) + 2\boxed{f_{\mathrm{NL}}^{\mathrm{loc}}}\left(b_G(z) - 1\right) \cdot \mathrm{stuff}(k,z)$$

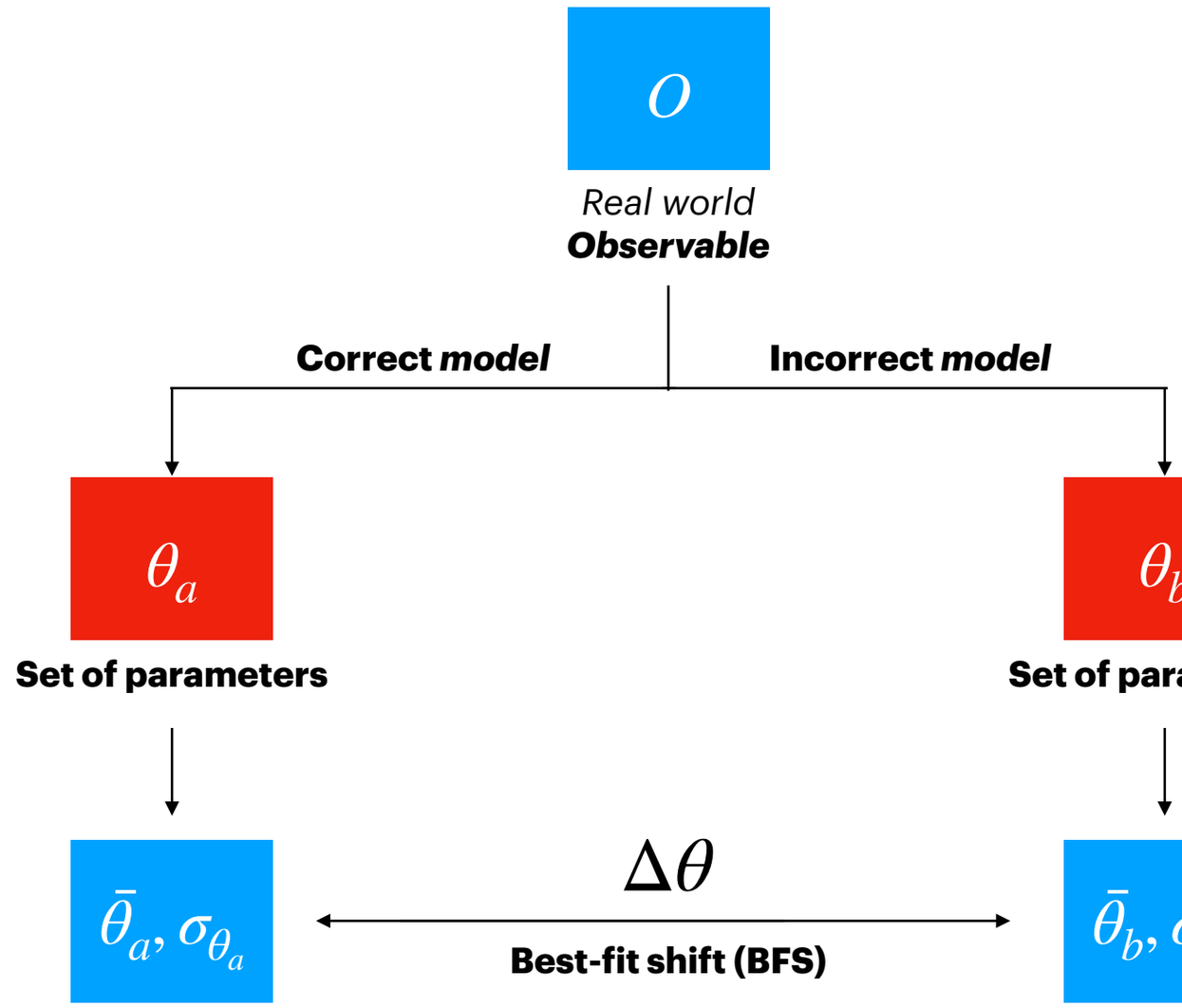
Primordial (local) **Non-Gaussianity**

[Desjacques et al. 2019]

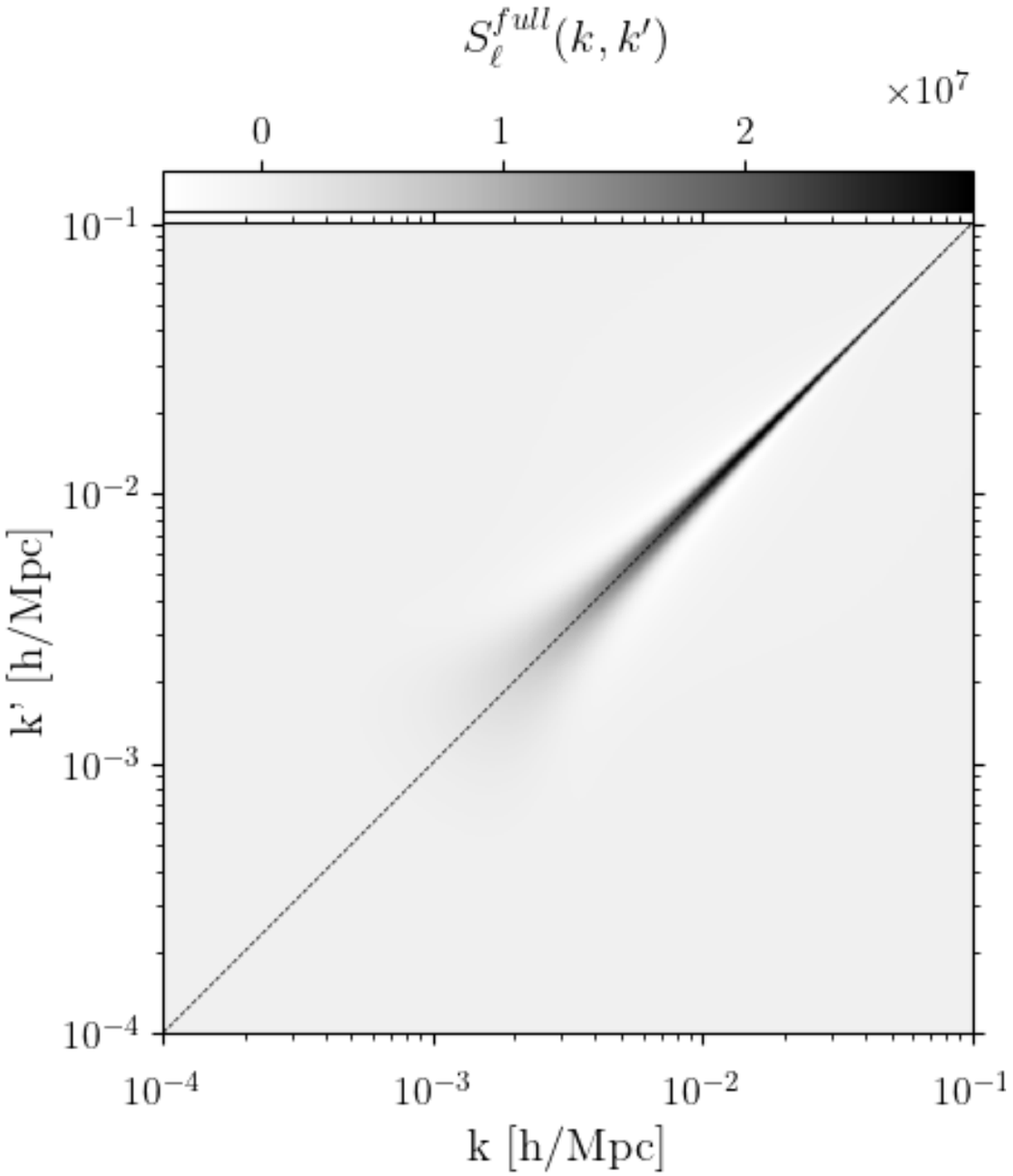
Some GR Effects Degenerate with f_{NL}

Impact of **GR projection effects** on cosmological parameter constraints

Impact on Forecasting



Painting a Spherical Sky



$$\langle \mathbf{x} \,|\, k\ell m \rangle = \sqrt{\frac{2}{\pi}} k j_\ell(kr) Y_{\ell m}(\hat{\mathbf{x}})$$

Spherical Fourier-Bessel basis

$$\mathcal{S}_\ell(k,k')$$

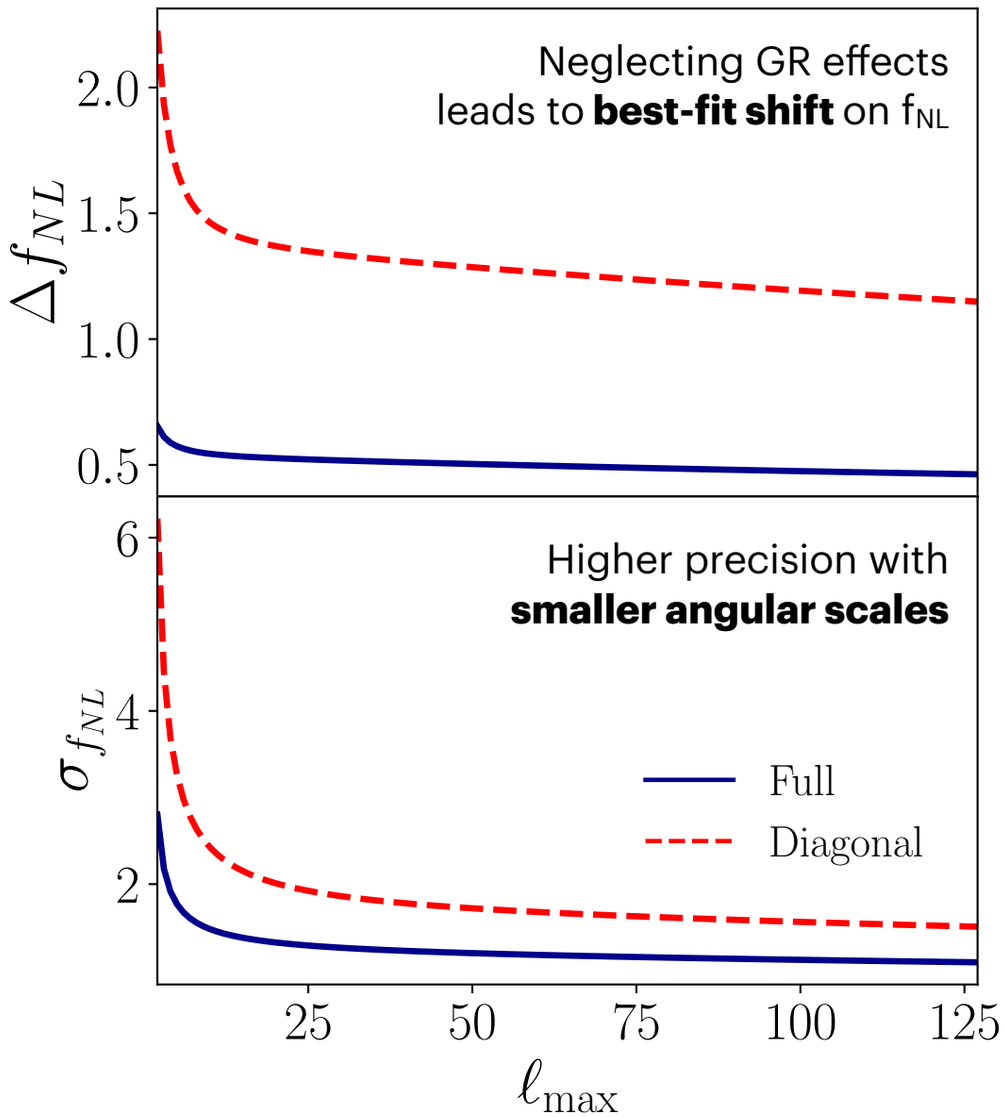
Power spectrum

Radial & angular information encoded

[Yoo&Desjaques 2013]
[Bertacca et al. 2018]

Impact on Forecasting

Projection effects have **relevant impact**!



$\Delta\theta$

Accuracy

Best-fit shifts

σ_θ

Precision

Full Fisher analysis

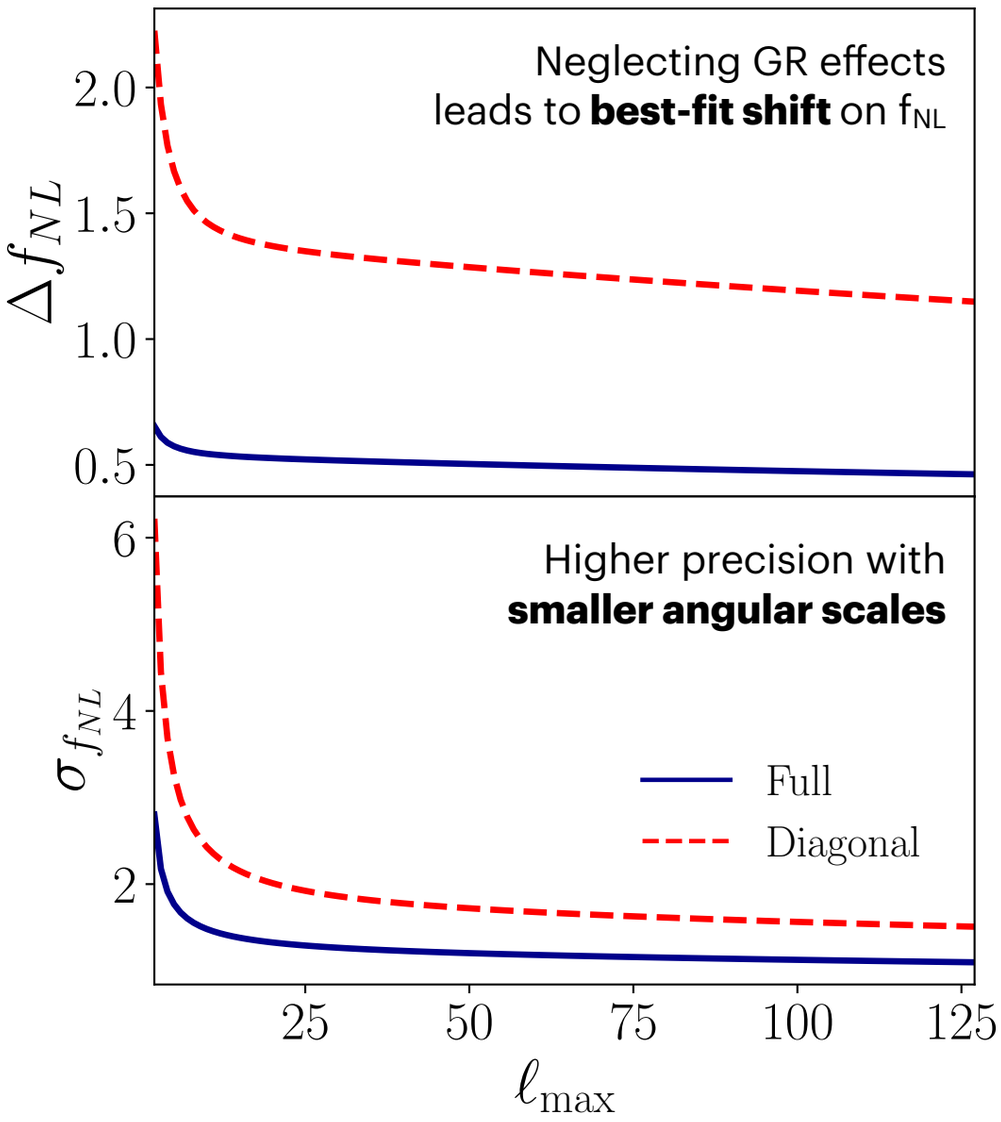
$\Delta\theta/\sigma_\theta$

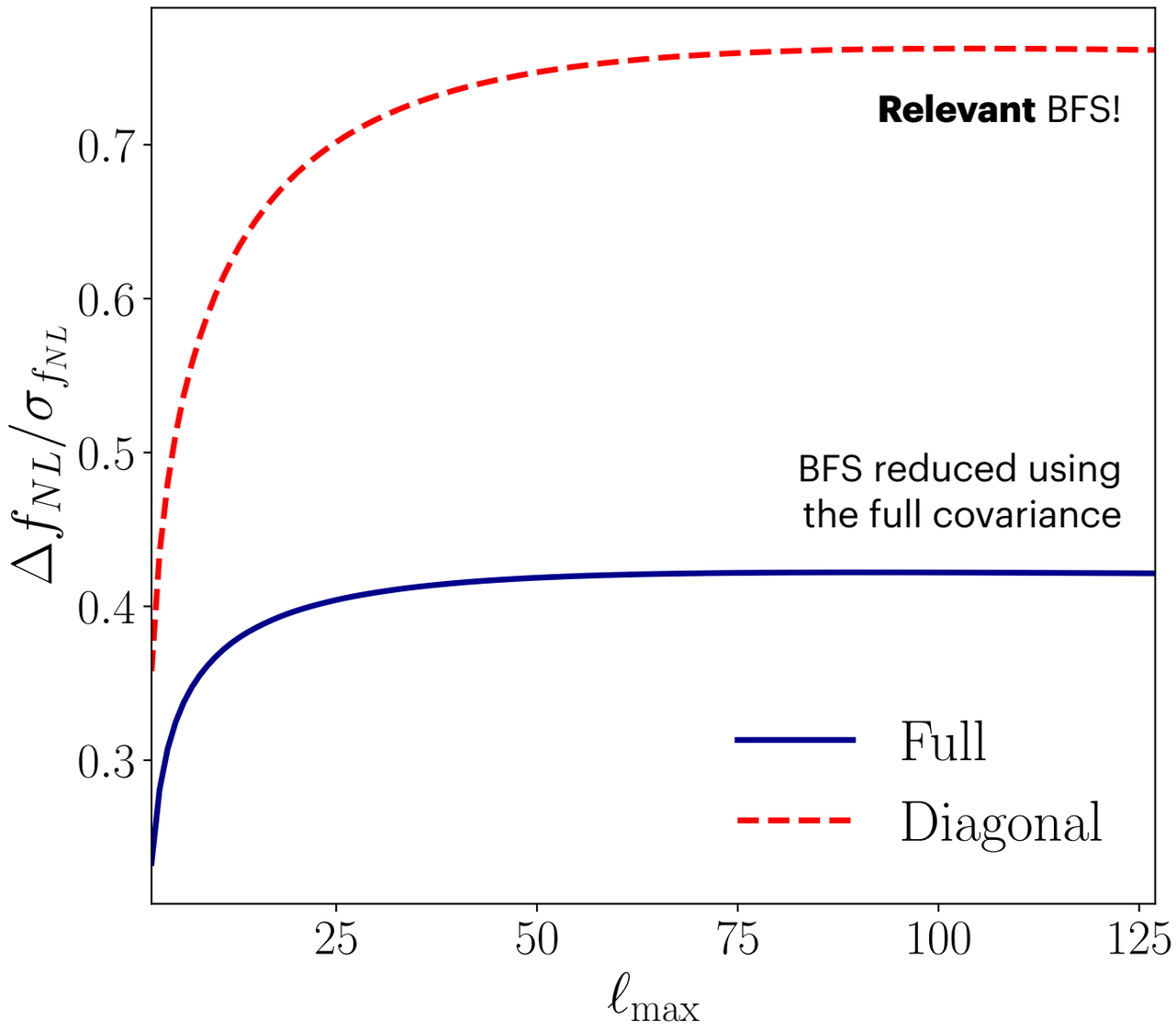
[Bernal et al. 2020]

We have results for varying bias, magnification bias, survey geometry

Impact on Forecasting

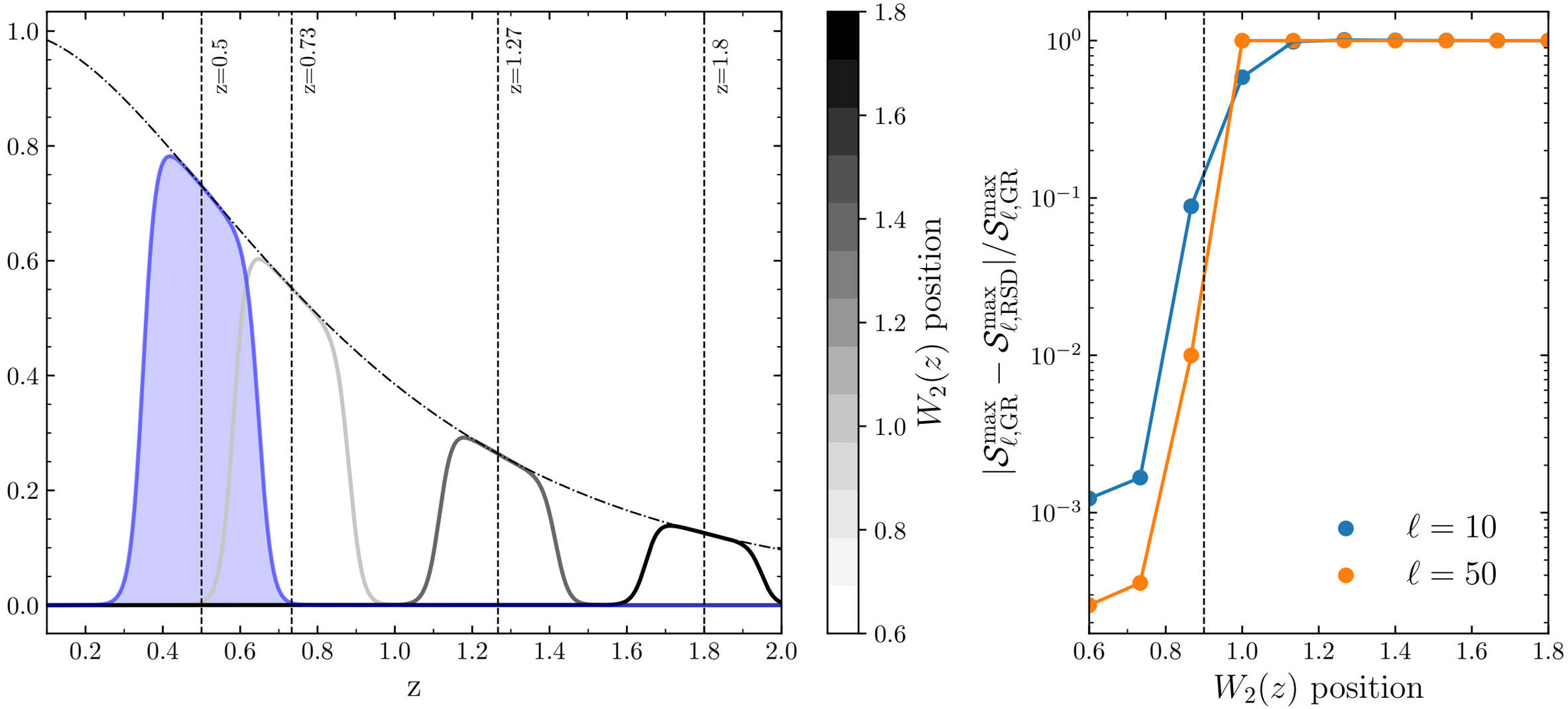
Projection effects have **relevant impact**!





We have results for varying bias, magnification bias, survey geometry

Multi-Window approach



Well-separated bins carry **clean signal** of GR effects!

IMPACT ON FORECASTING

ACCURACY ON *INL* AFFECTED

GR EFFECTS ARE *RELEVANT*!

MULTI WINDOW

CLEAN *IMPRINT* OF GR EFFECTS

INCREASED *DETECTABILITY*!

arXiv-2405.XXX
FEDERICO SEMENZATO
federico.semenzato.1@phd.unipd.it