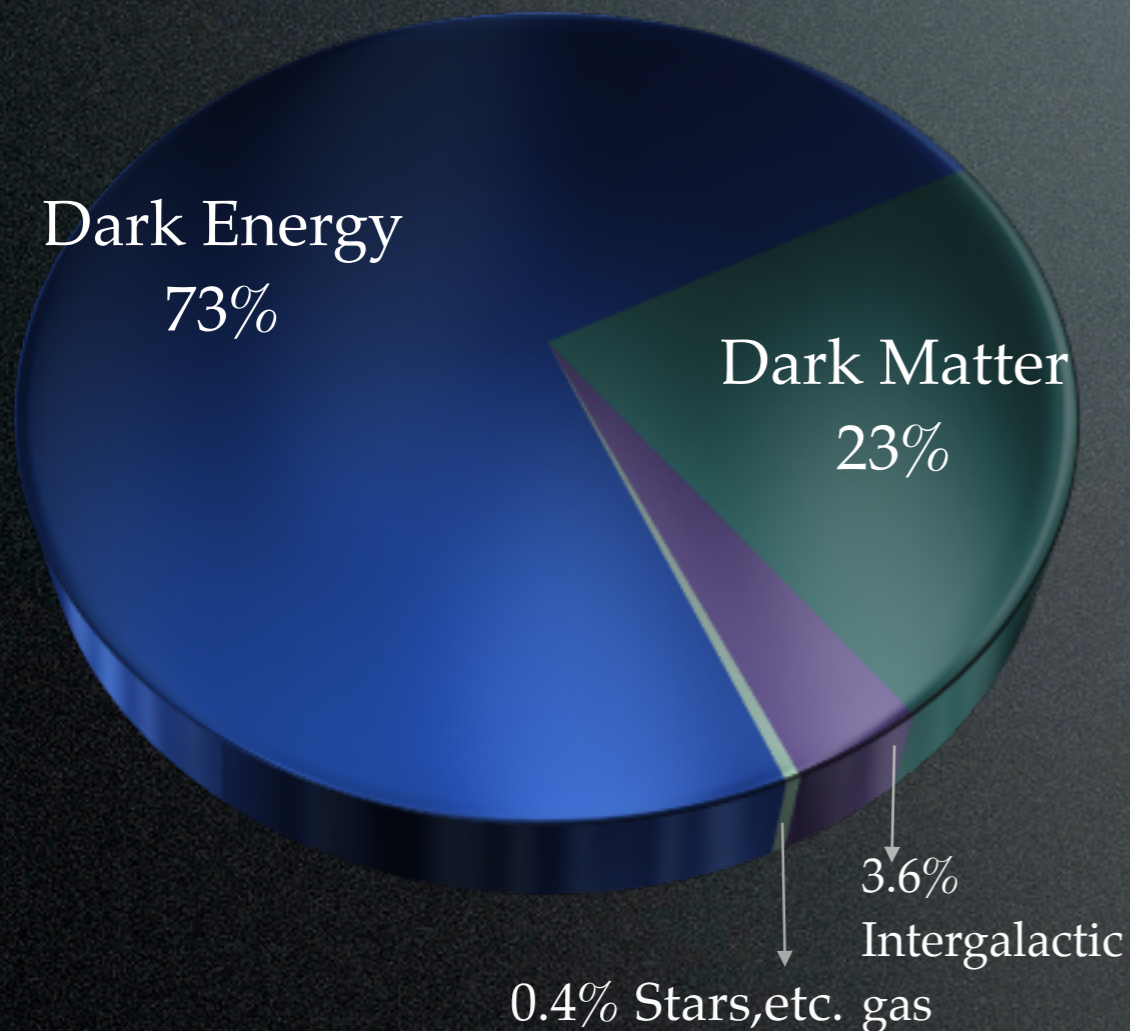


EFFECT OF NON-LINEAR STRUCTURE AND BARYONS IN SHEAR POWER SPECTRUM

Sanghamitra Deb
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Collaborators: Salman Habib, Katrin Heitmann

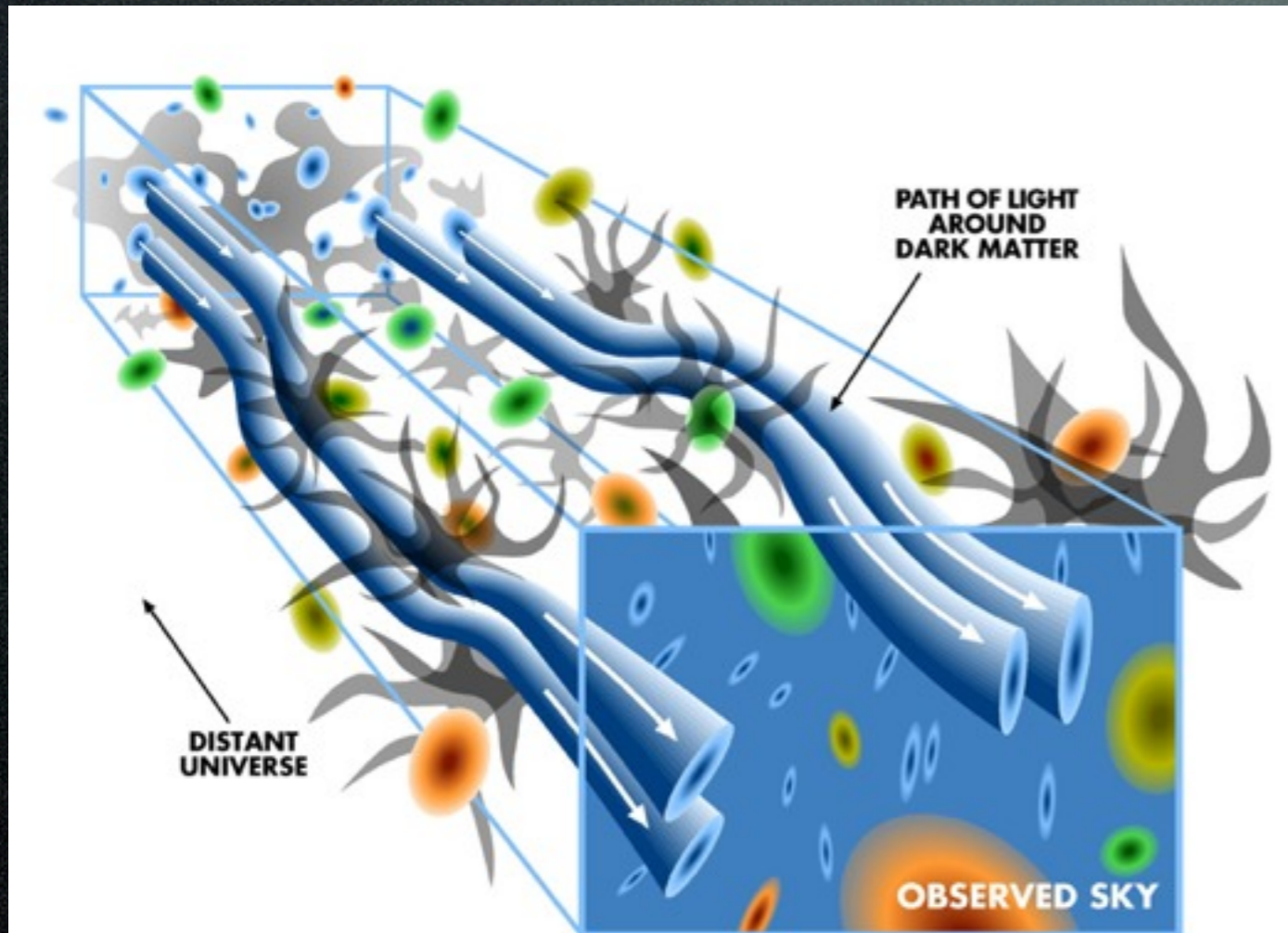
ENERGY BUDGET OF THE UNIVERSE



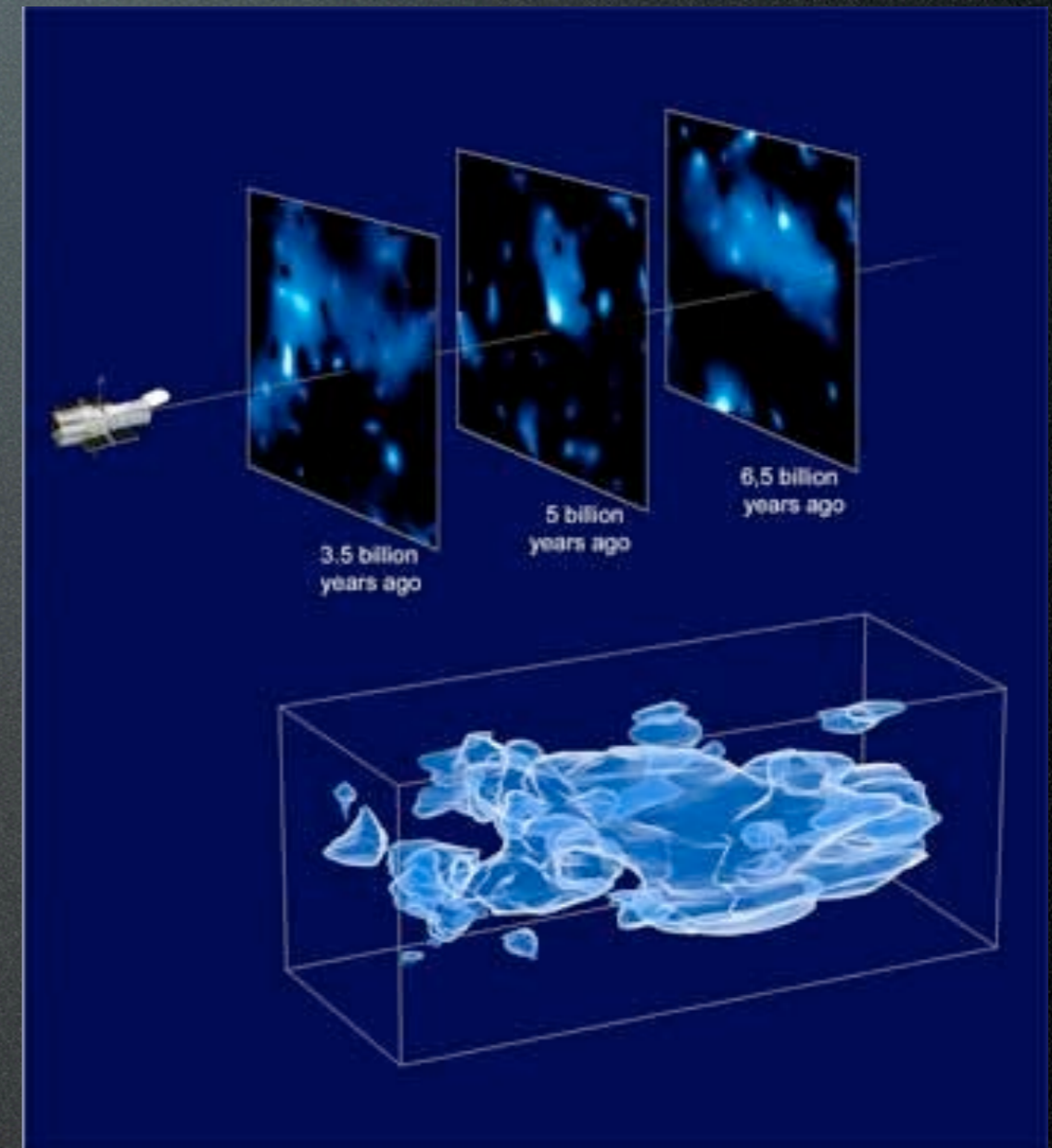
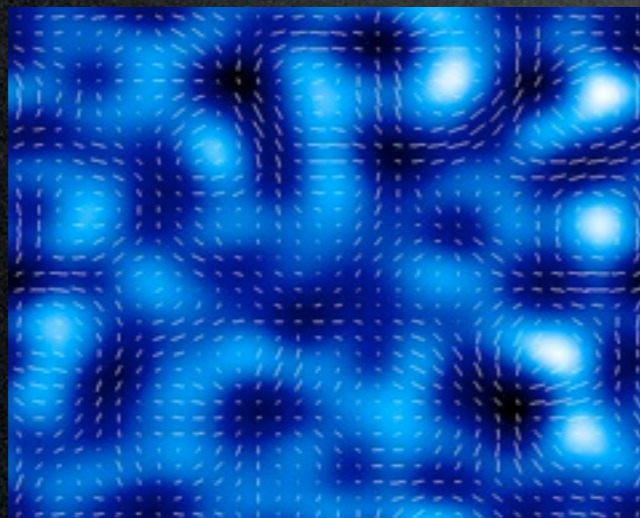
Gravitational lensing will be one of the key techniques to unveiling the “Dark” part of our universe.

Current surveys (DES, LSST, EUCLID, ...) are aimed at understanding Dark Energy and Dark Matter

COSMIC SHEAR IS THE WEAK DISTORTION OF GALAXY SHAPES



http://lsst.org/lsst/science/scientist_cosmic_shear



Massey et al.

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COSMIC SHEAR: THEORY

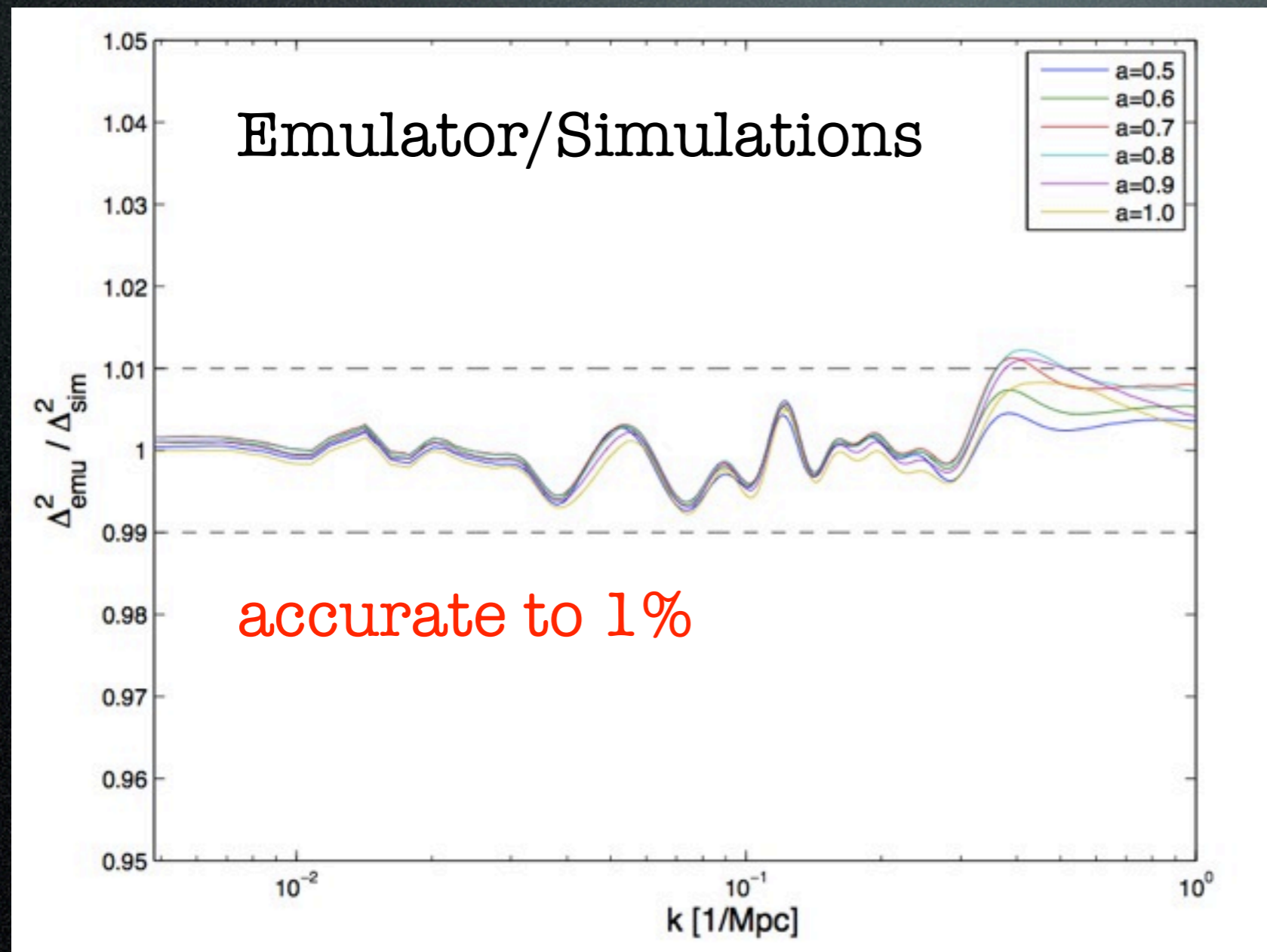
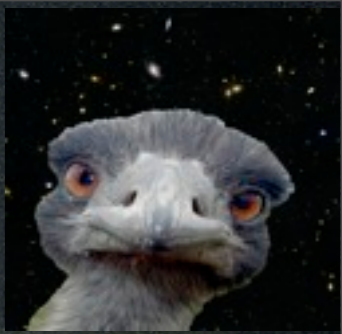
$$P_E(\ell) = \frac{9H_0^4 \Omega_m^2}{4c^4} \int_0^{w_h} dw \frac{g^2(w)}{a^2(w)} P_\delta \left(\frac{\ell}{f_K(w)}, w \right)$$

Shear Power
Spectrum

Lensing
Weight Function

3D Power
spectrum

EMULATING THE 3D POWER SPECTRUM

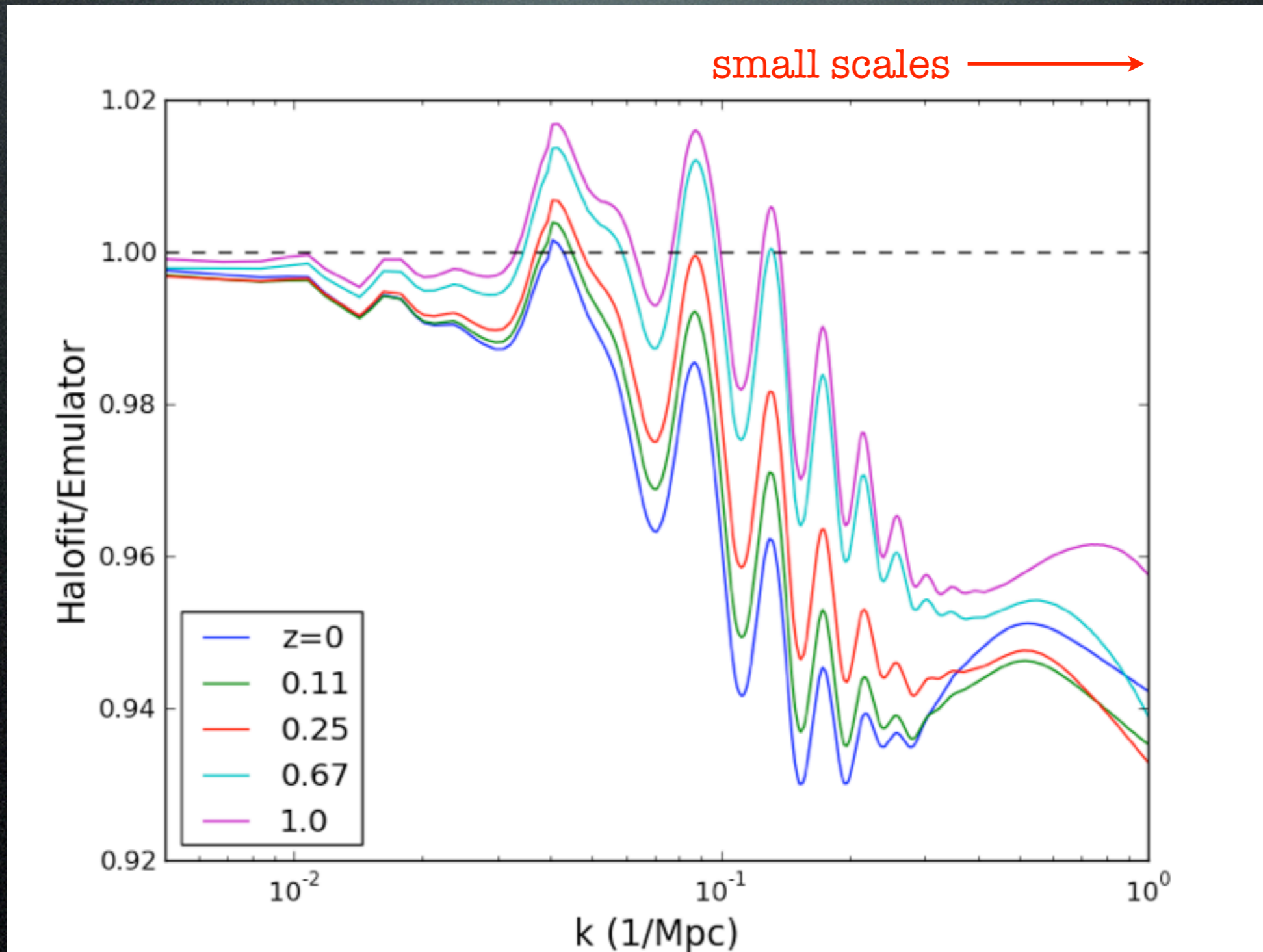


Heitmann et al. 2008, 2009 & Lawrence et al. 2010

- Perturbation theory at quasi linear regime
- 37 parameter sets chosen using Latin Hyper Cube design.
- Gaussian Process Modeling interpolation scheme.

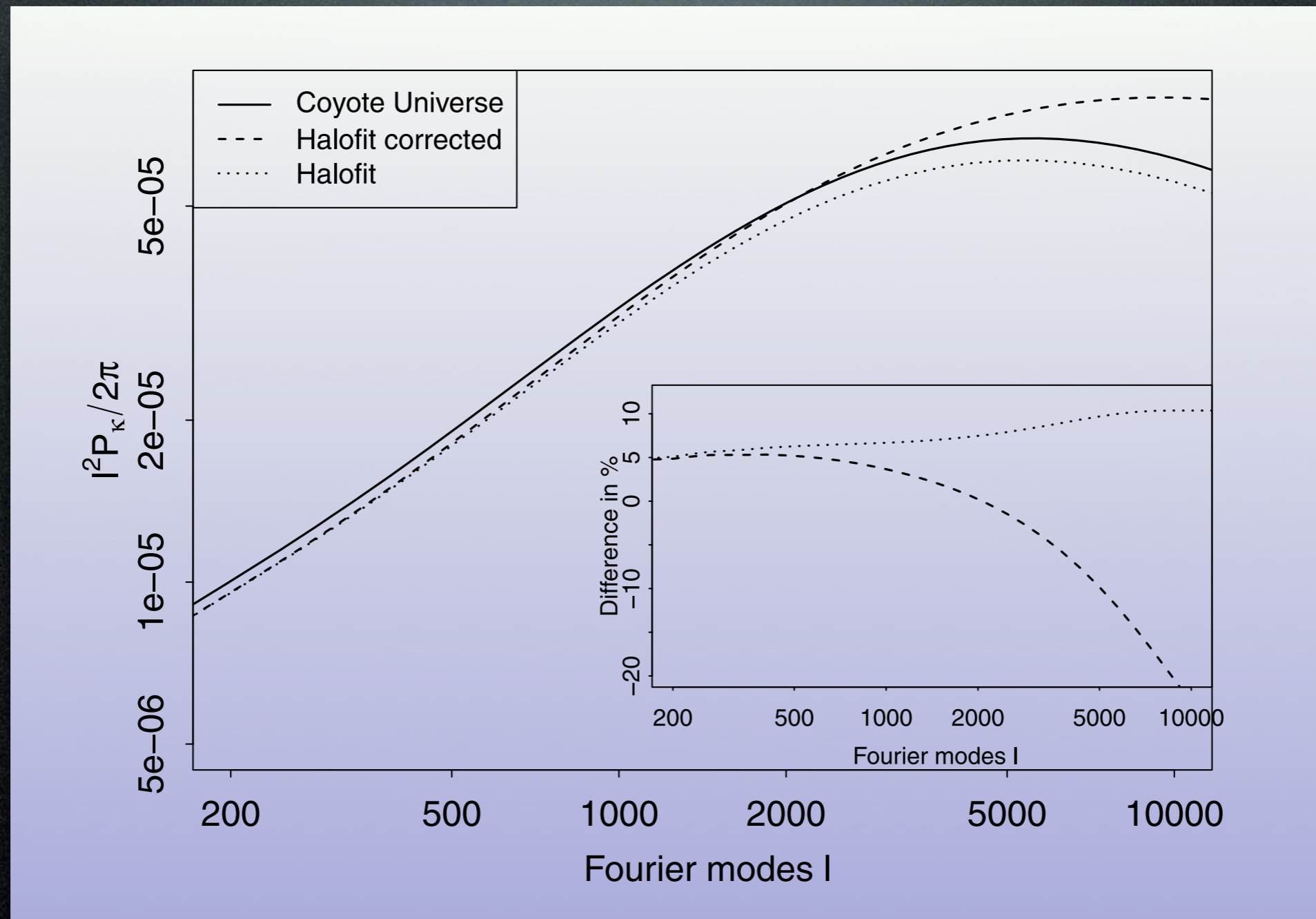
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EMULATOR ACCURATELY PREDICTS THE SMALL SCALE POWER SPECTRUM



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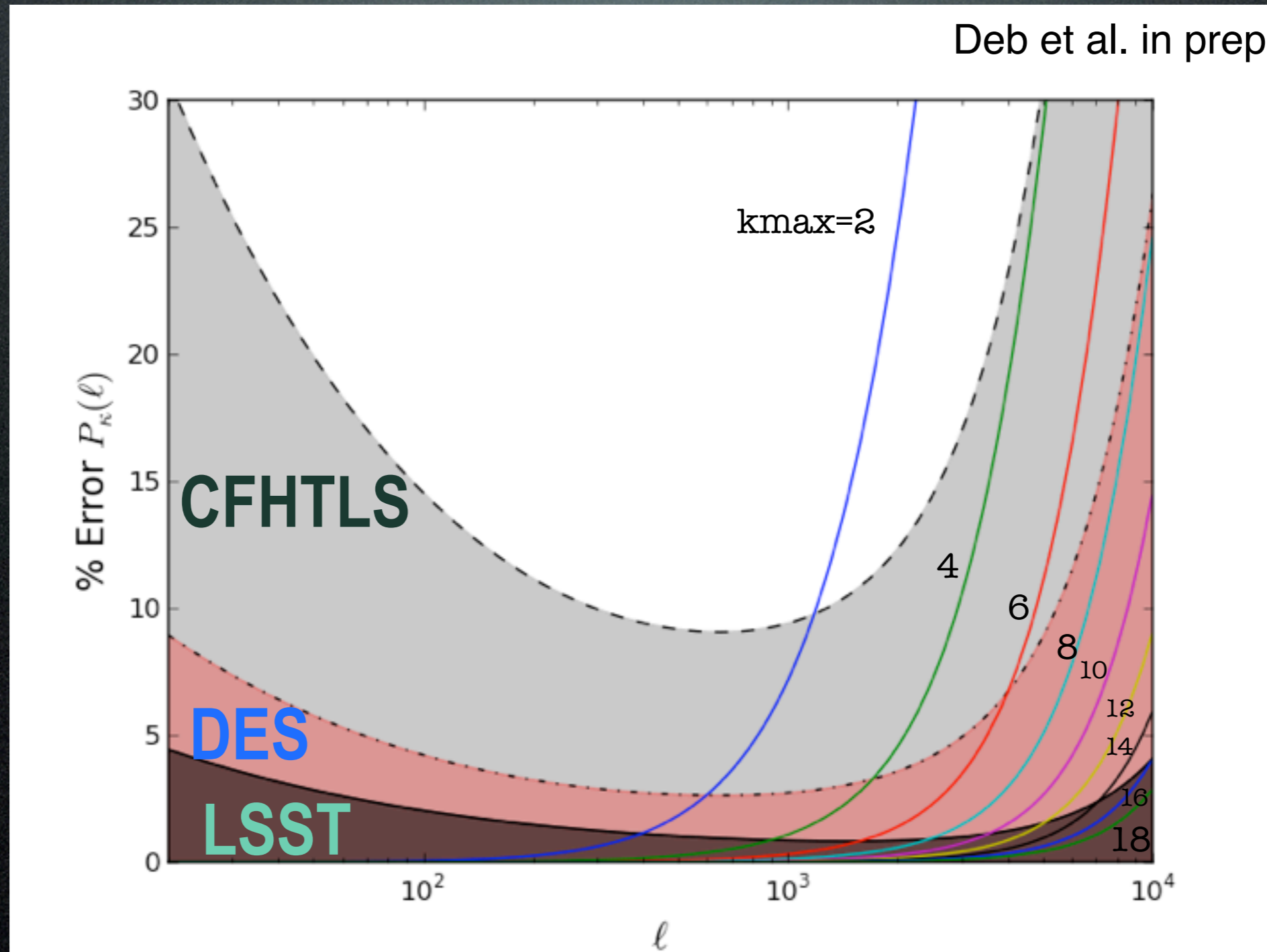
EMULATING THE SHEAR POWER SPECTRUM



Eifler et al. 2011

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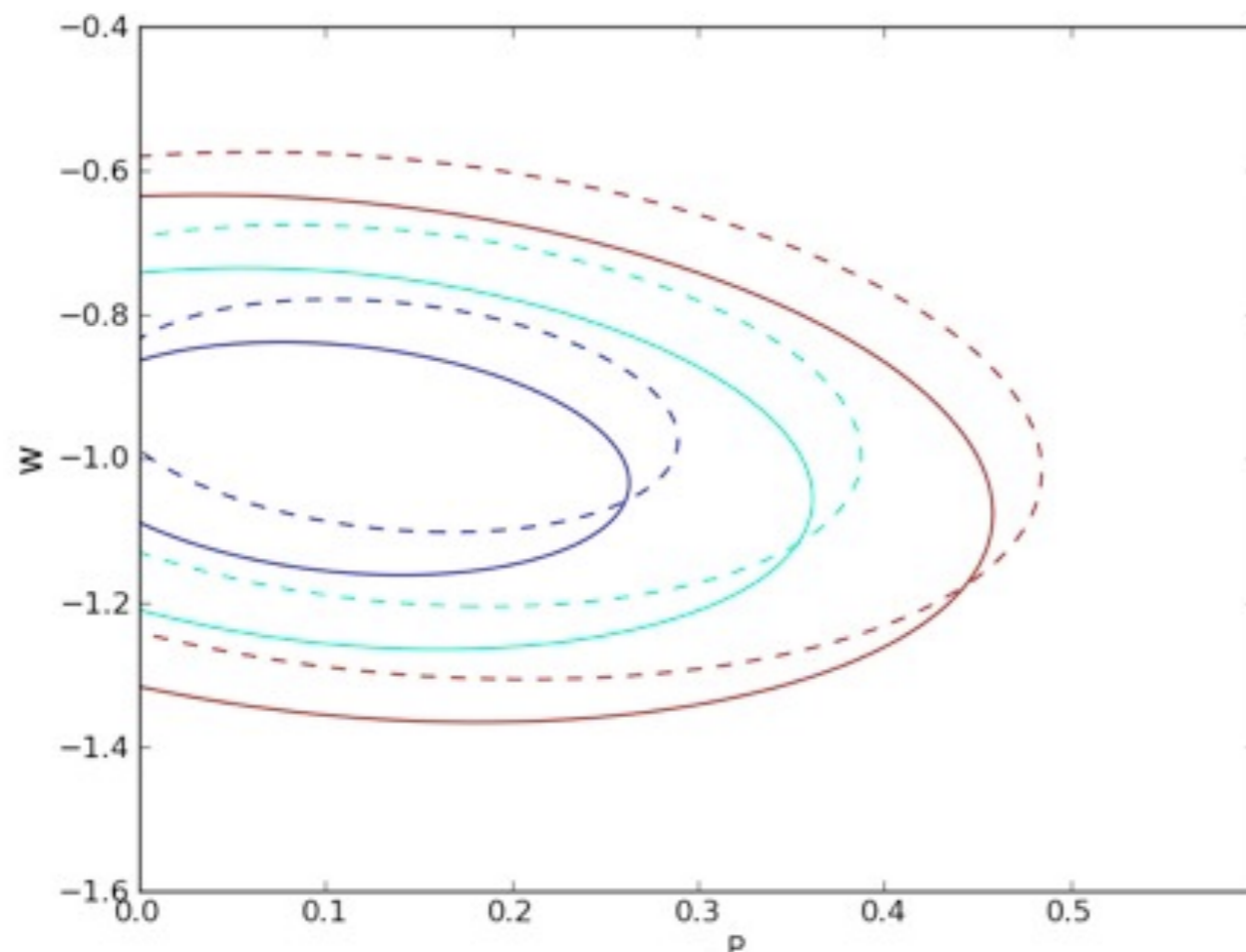
REQUIREMENTS ON THE 3D POWER SPECTRUM



see also Huterer and Takada 2003

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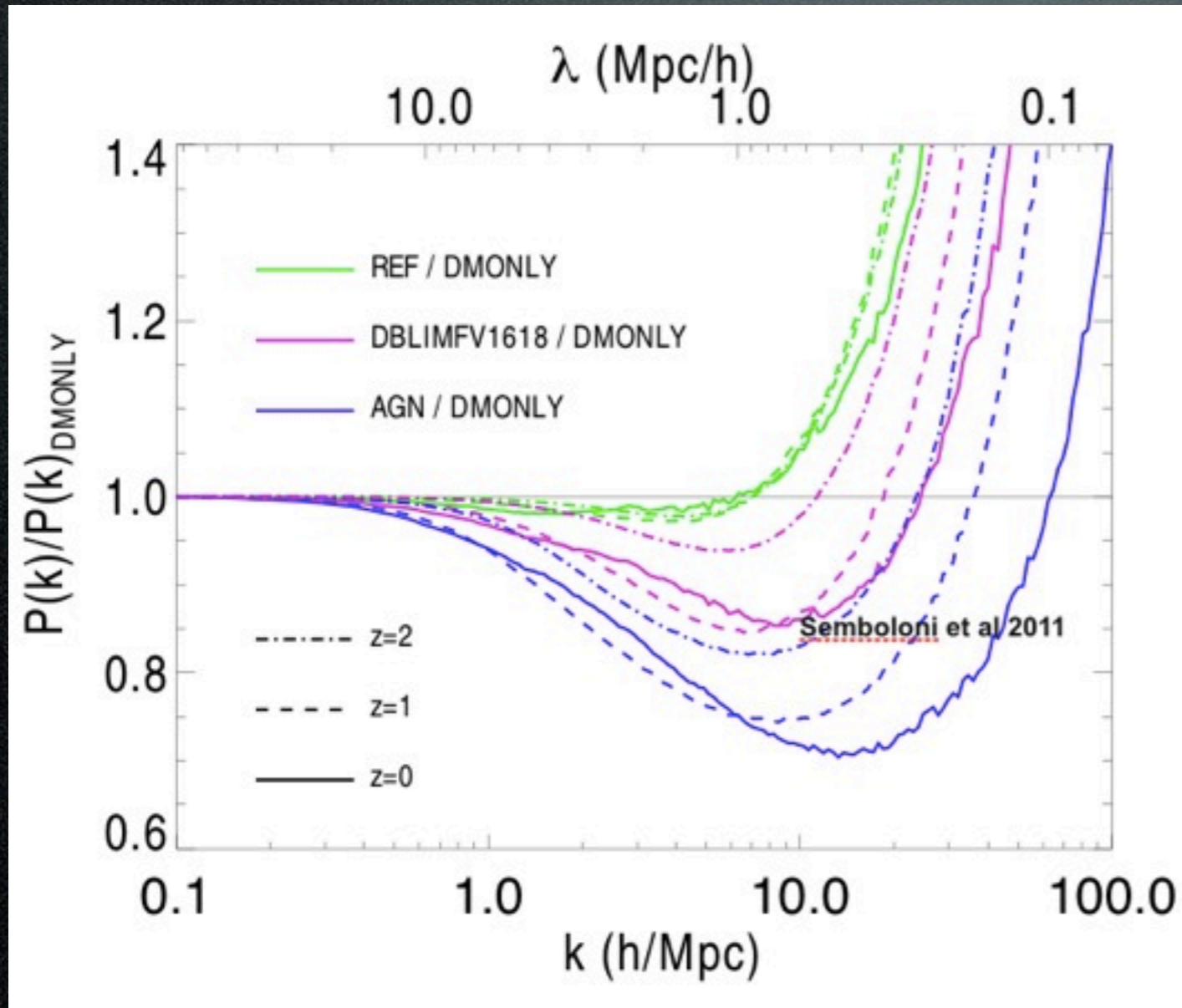
BIAS IN DARK ENERGY



Bias in parameters and w by not including small scale in formation. The dotted lines are for $k_{\text{max}} = 1 \text{ h/Mpc}$

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EFFECT OF BARYONS



Baryonic processes such as star formation, radiative transfer and AGN feedback can alter the matter power spectrum significantly.

Thank You