Cosmological results from the galaxy power spectrum of the VIPERS galaxy distribution

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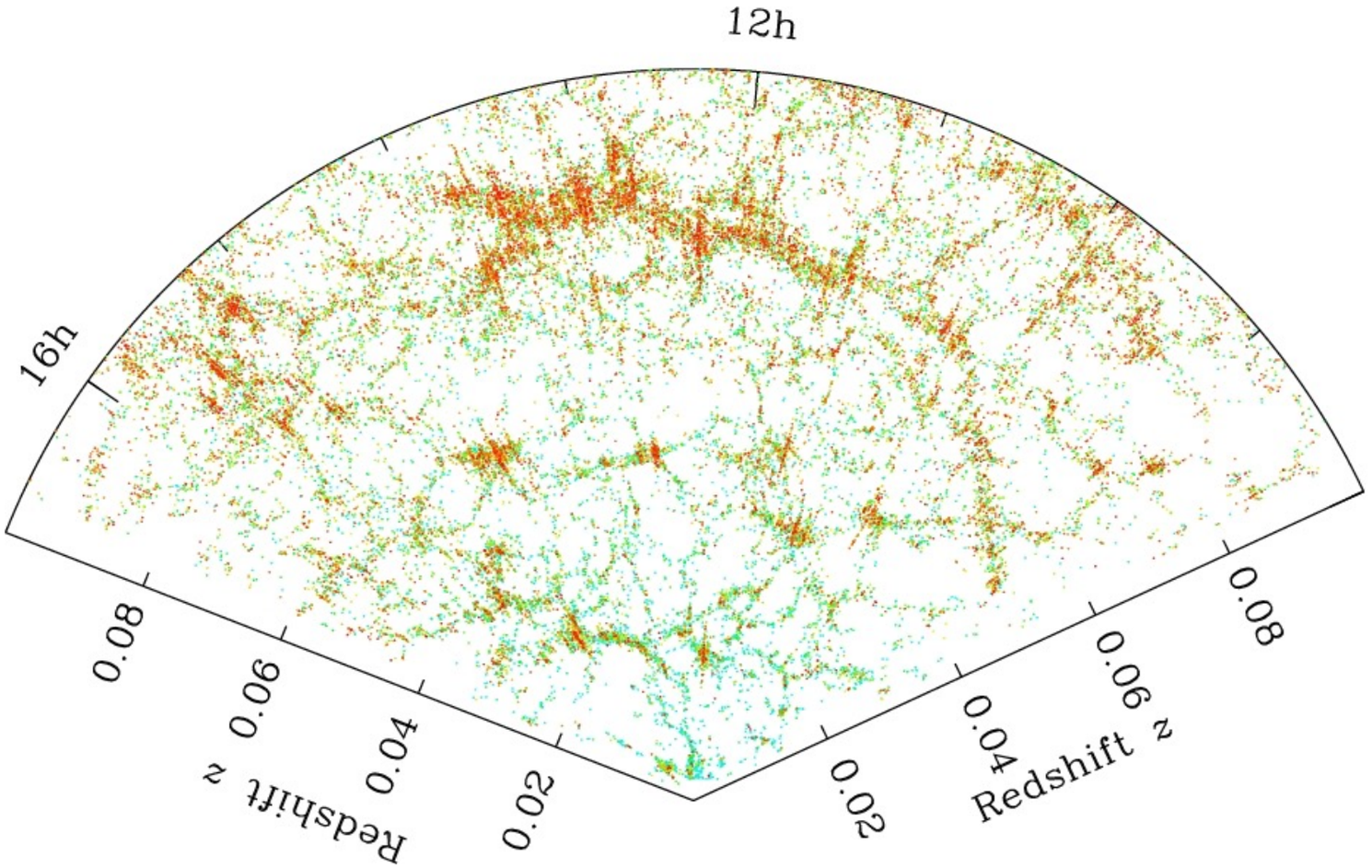
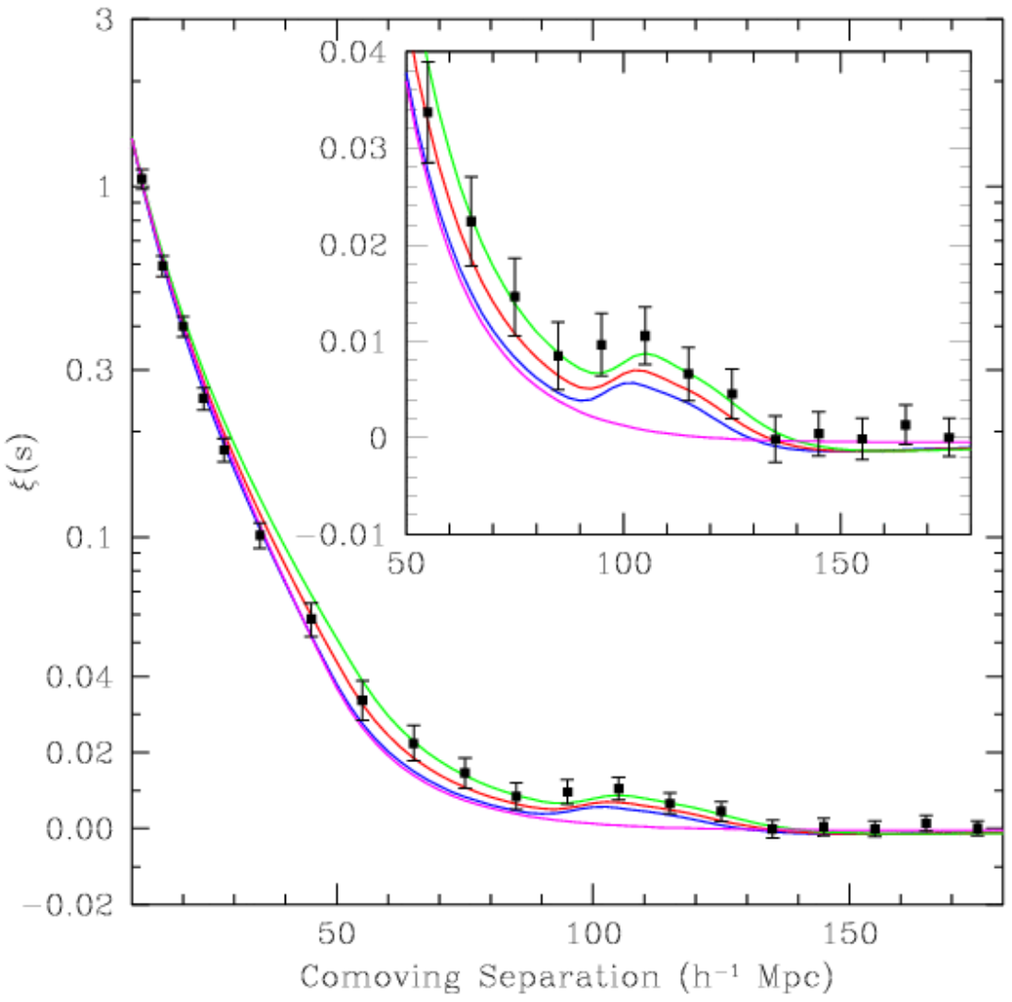
Astrosiesta 17/11/2016

- Estimate galaxy clustering on large scales
- Compare with theory
- Extract cosmological quantities

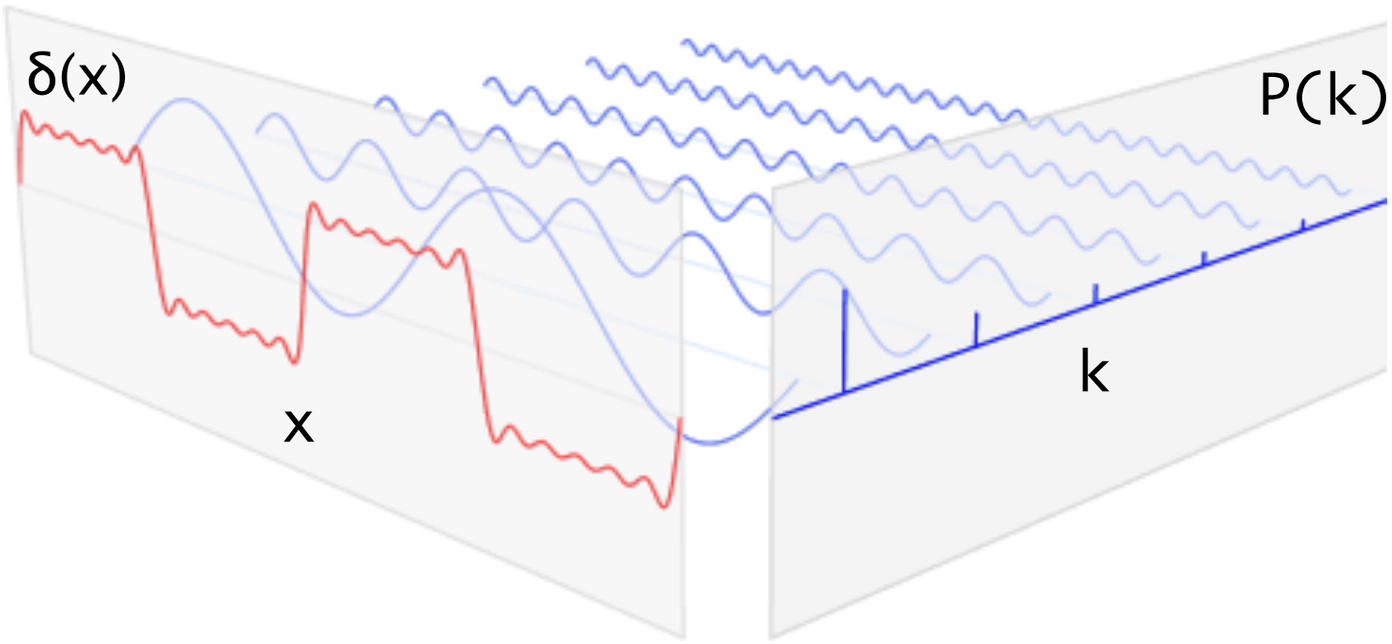
Clustering in Configuration space

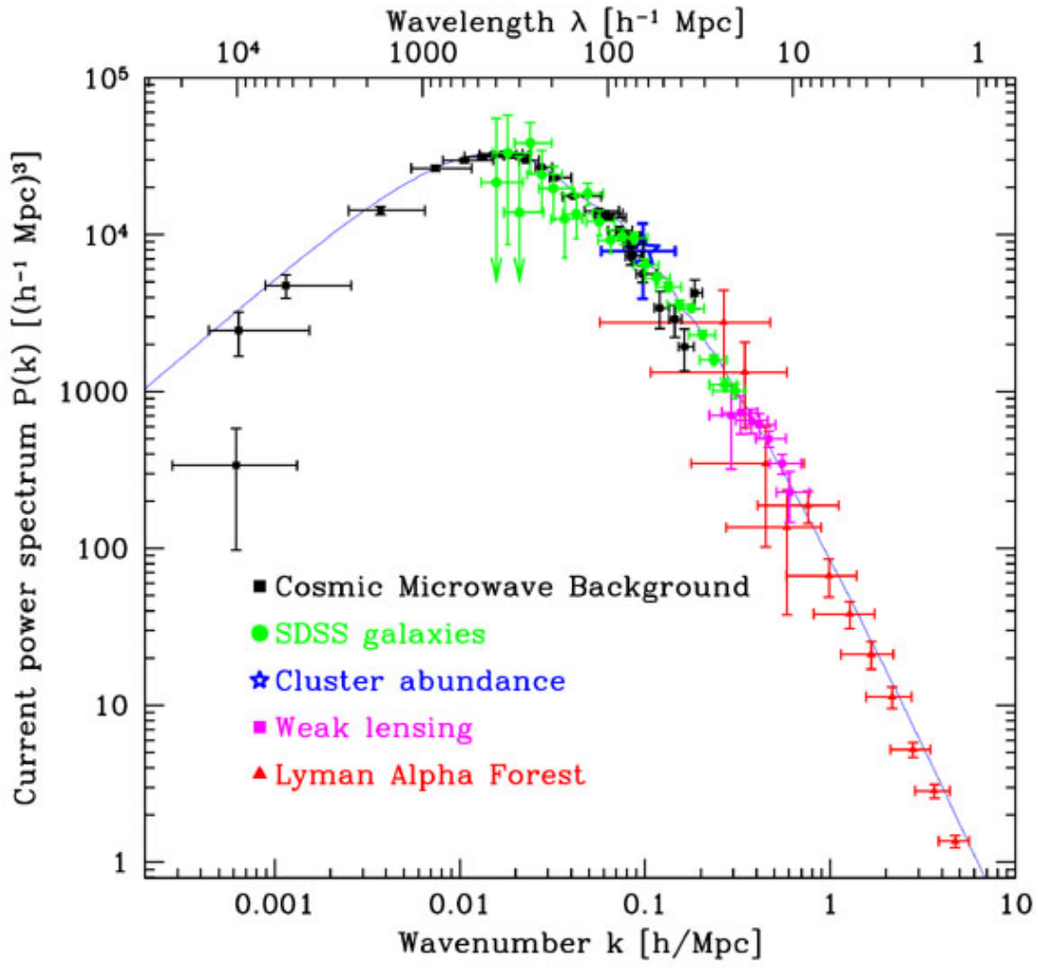




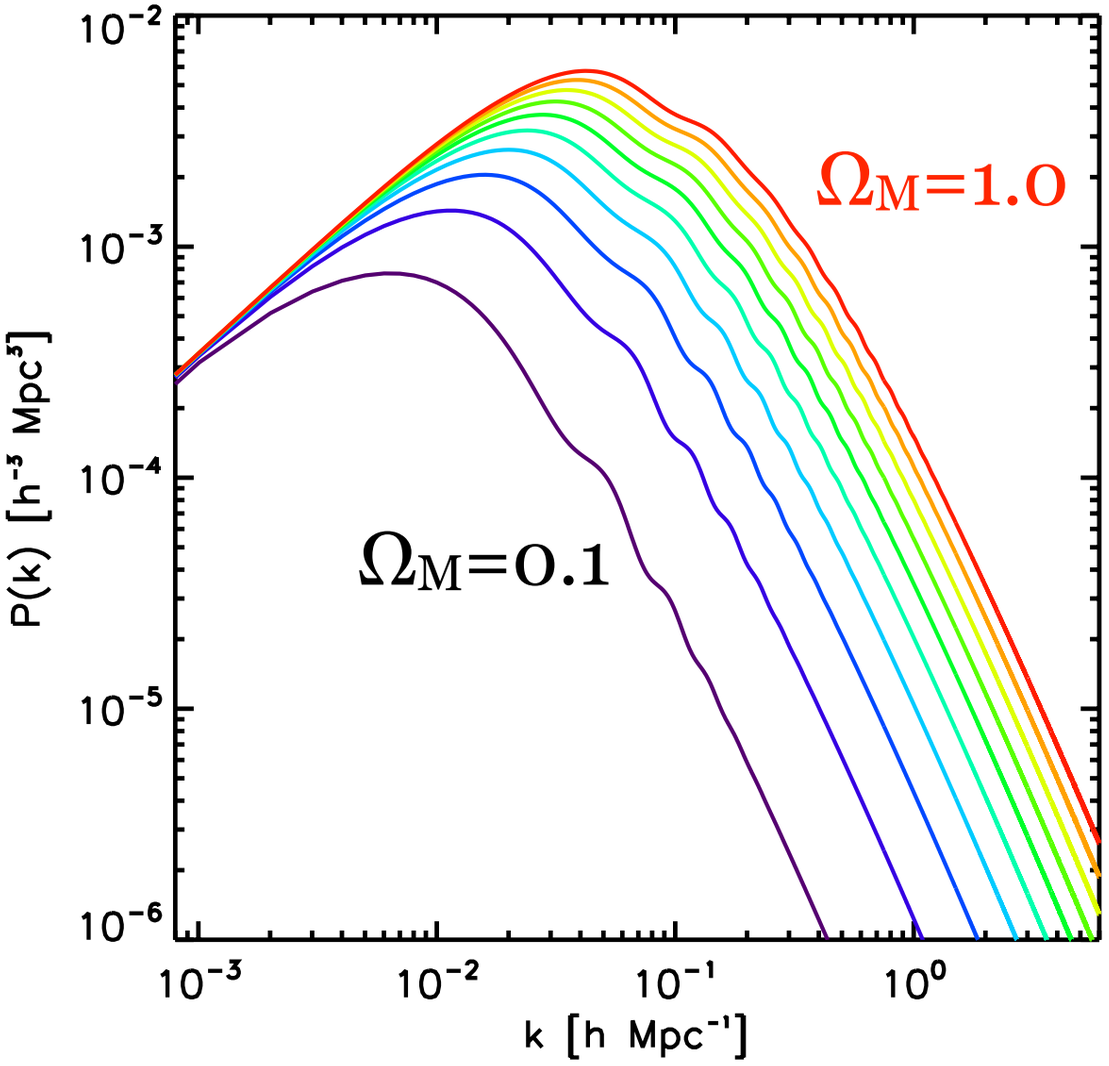
$$\xi(\mathbf{x}_1, \mathbf{x}_2) \equiv \langle \delta(\mathbf{x}_1)\delta(\mathbf{x}_2) \rangle$$

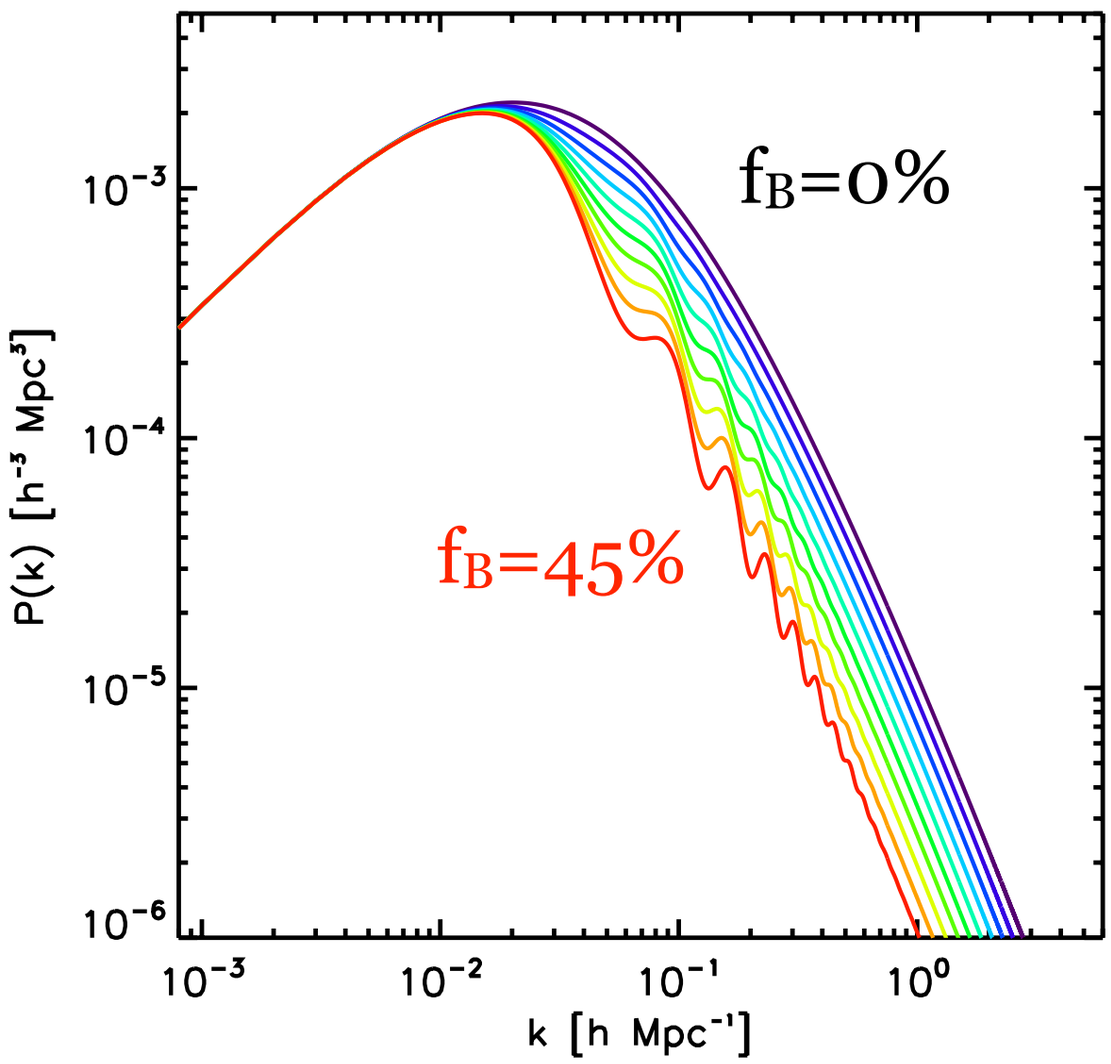
Clustering in Fourier space



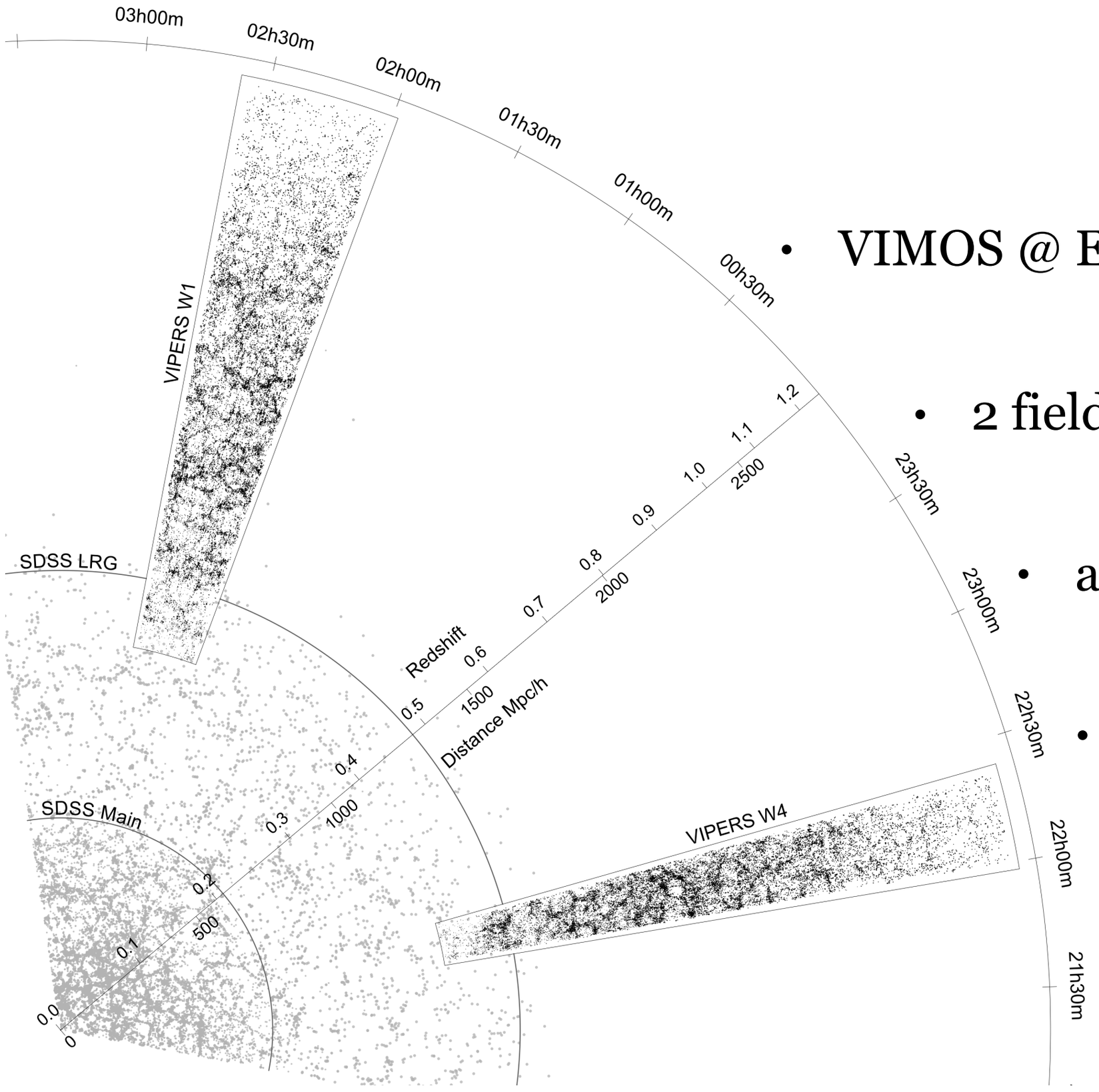


$$\mathrm{P}(\mathbf{k}_1, \mathbf{k}_2) \equiv \langle \delta(\mathbf{k}_1)\delta^*(\mathbf{k}_2)\rangle$$


Ω_M=1.0
Ω_M=0.1
P(k) [h⁻³ Mpc³]
k [h Mpc⁻¹]
10⁻²
10⁻³
10⁻⁴
10⁻⁵
10⁻⁶
10⁻³
10⁻²
10⁻¹
10⁰

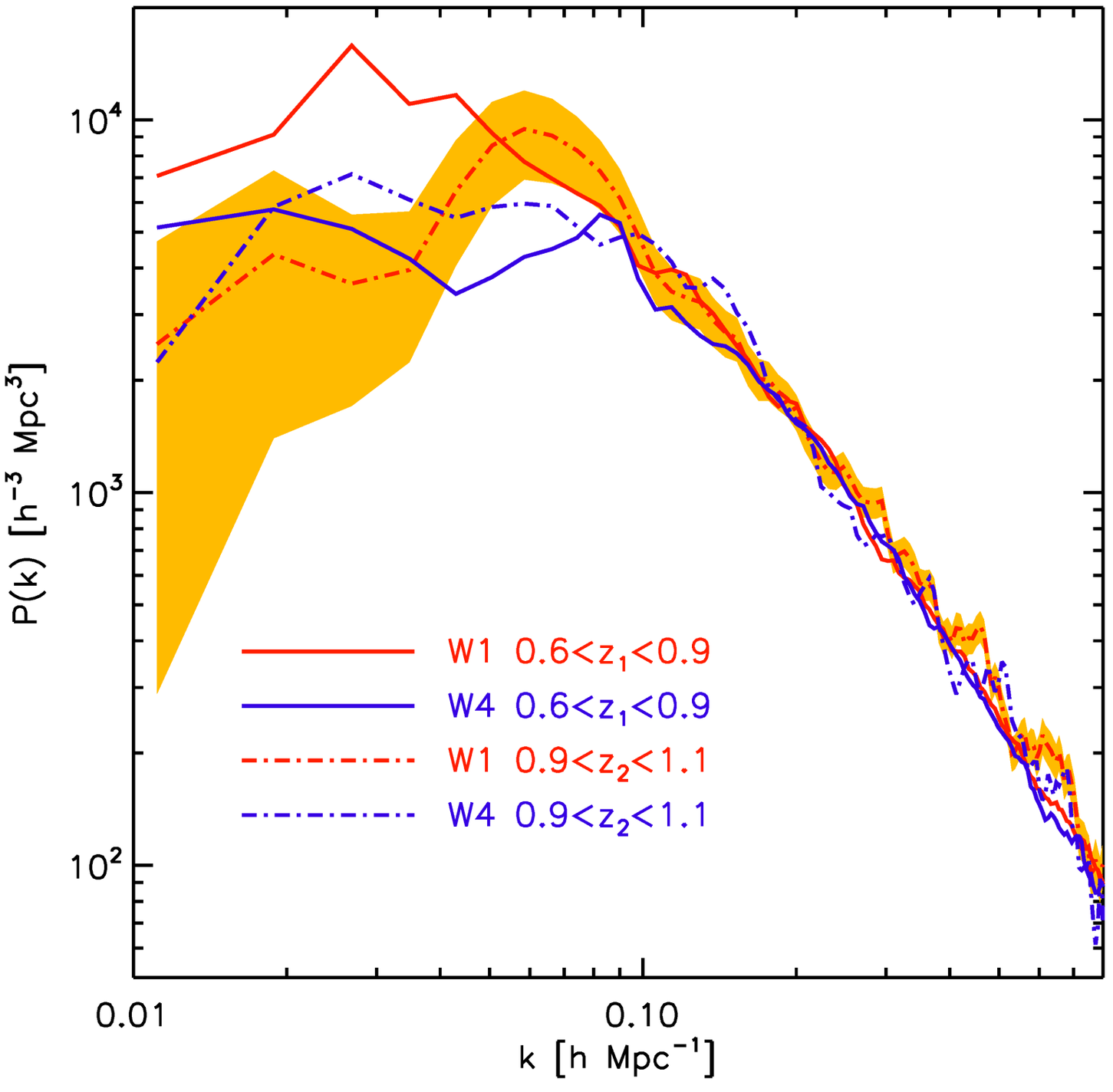

f_B=0%
f_B=45%
P(k) [h⁻³ Mpc³]
k [h Mpc⁻¹]
10⁻³
10⁻⁴
10⁻⁵
10⁻⁶
10⁻³
10⁻²
10⁻¹
10⁰

VIPERS

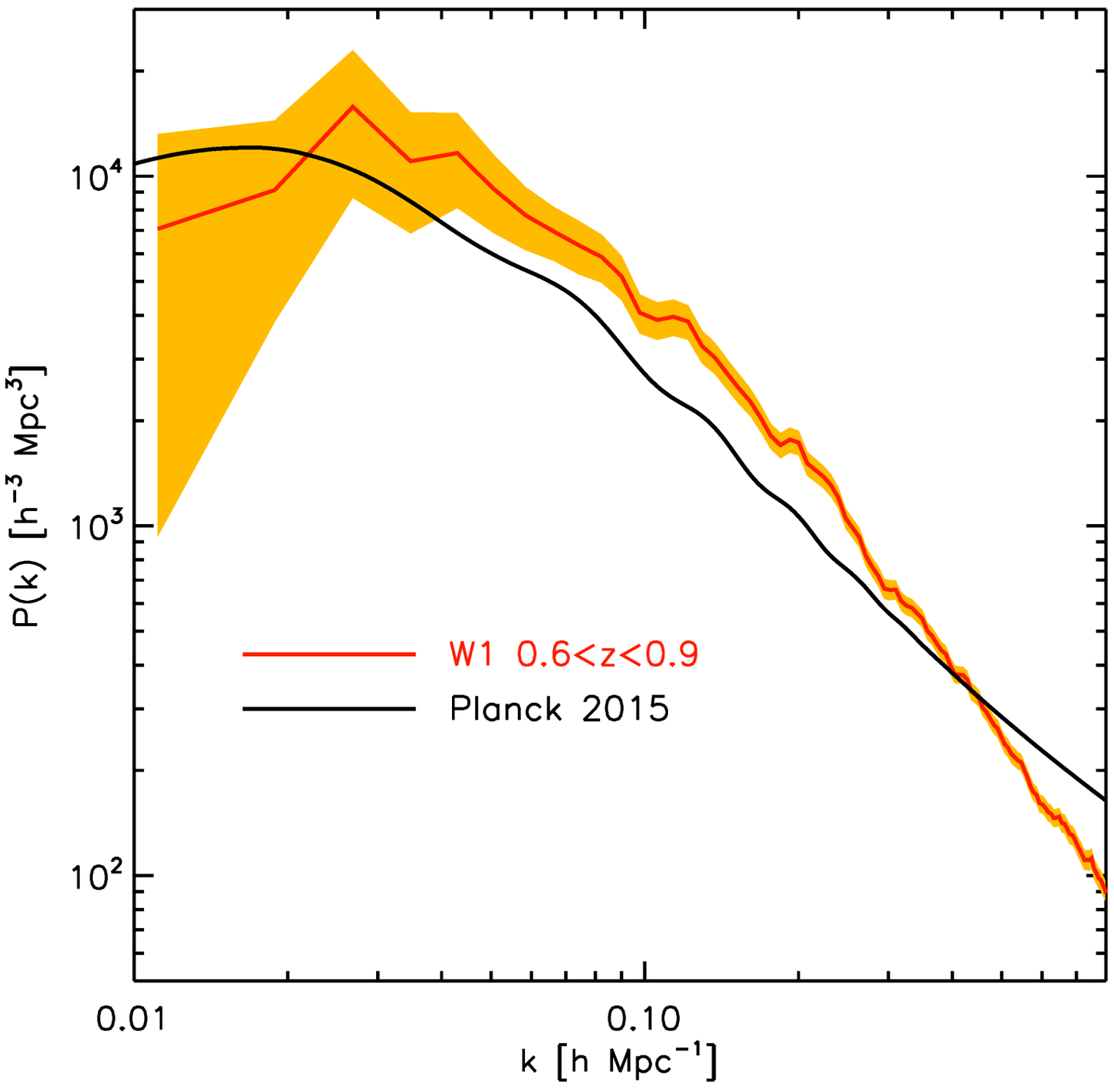


- VIMOS @ ESO VLT
- 2 fields: W1 and W4 of CFHTLS
- angular coverage 24 deg^2
- redshift range: $0.4<z<1.2$
- ~100,000 galaxies

VIPERS P(k)


10^4
10^3
10^2
P(k) [h^{-3} Mpc^3]
0.01
0.10
k [h Mpc^{-1}]
W1 0.6<z_1<0.9
W4 0.6<z_1<0.9
W1 0.9<z_2<1.1
W4 0.9<z_2<1.1

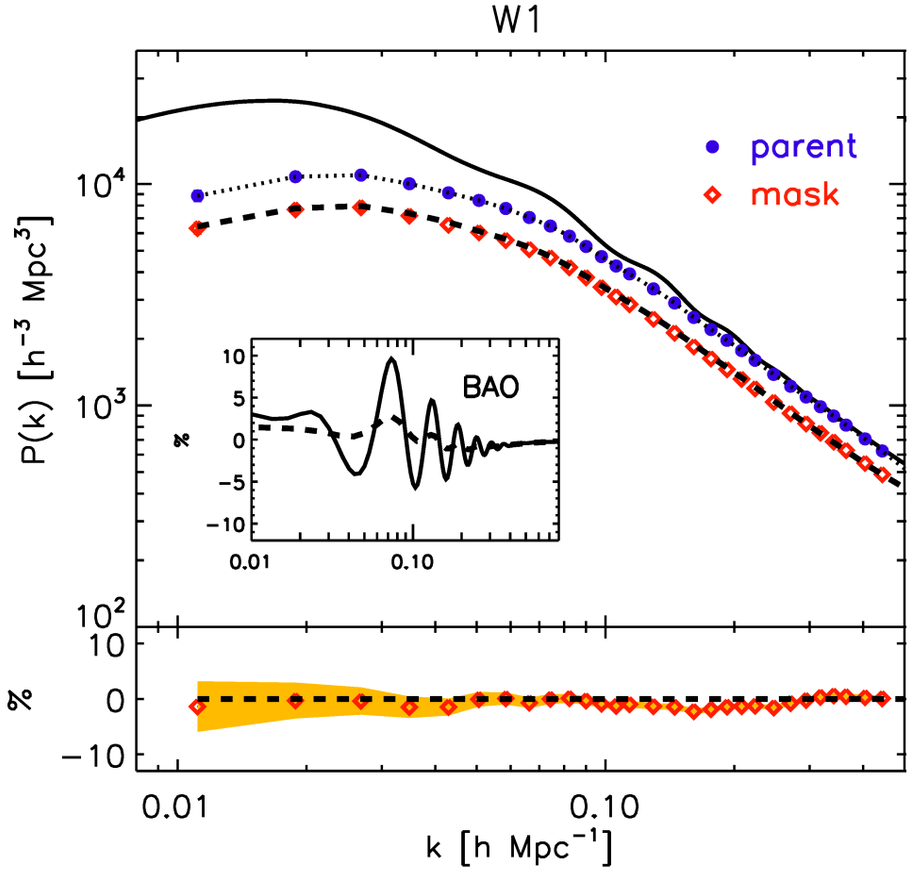
Observation VS Theory



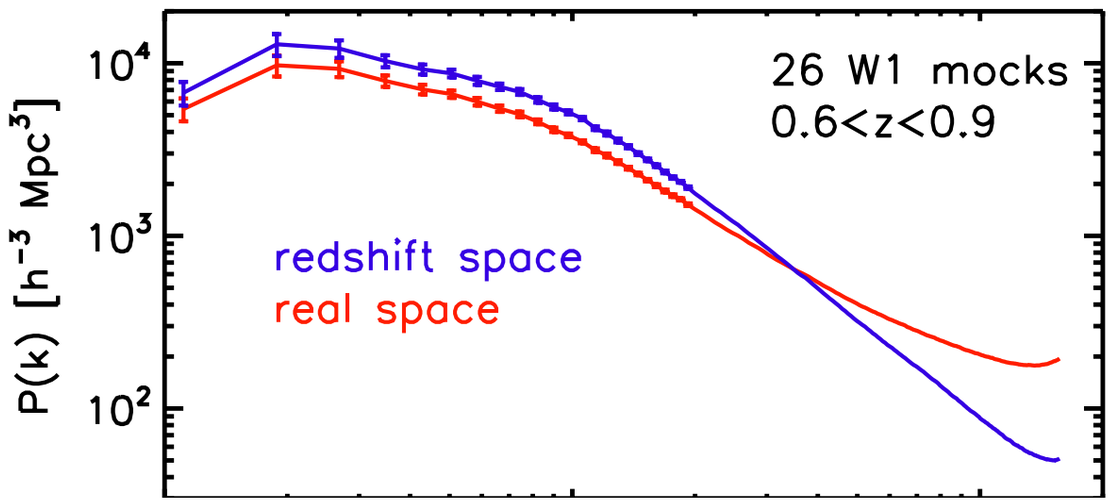
Observation VS Theory

1) bias
2) redshift space distortions
3) window function

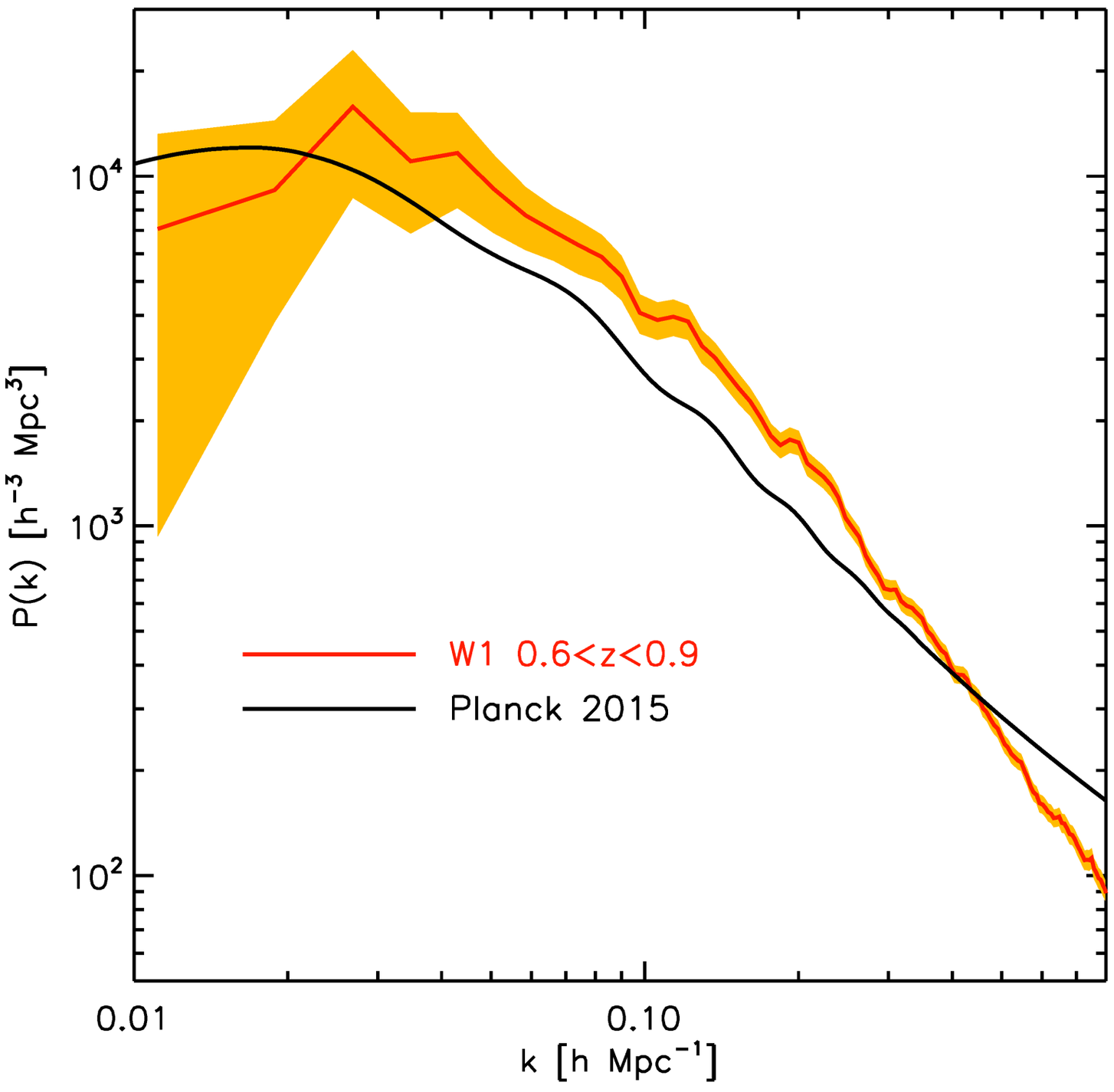
window function



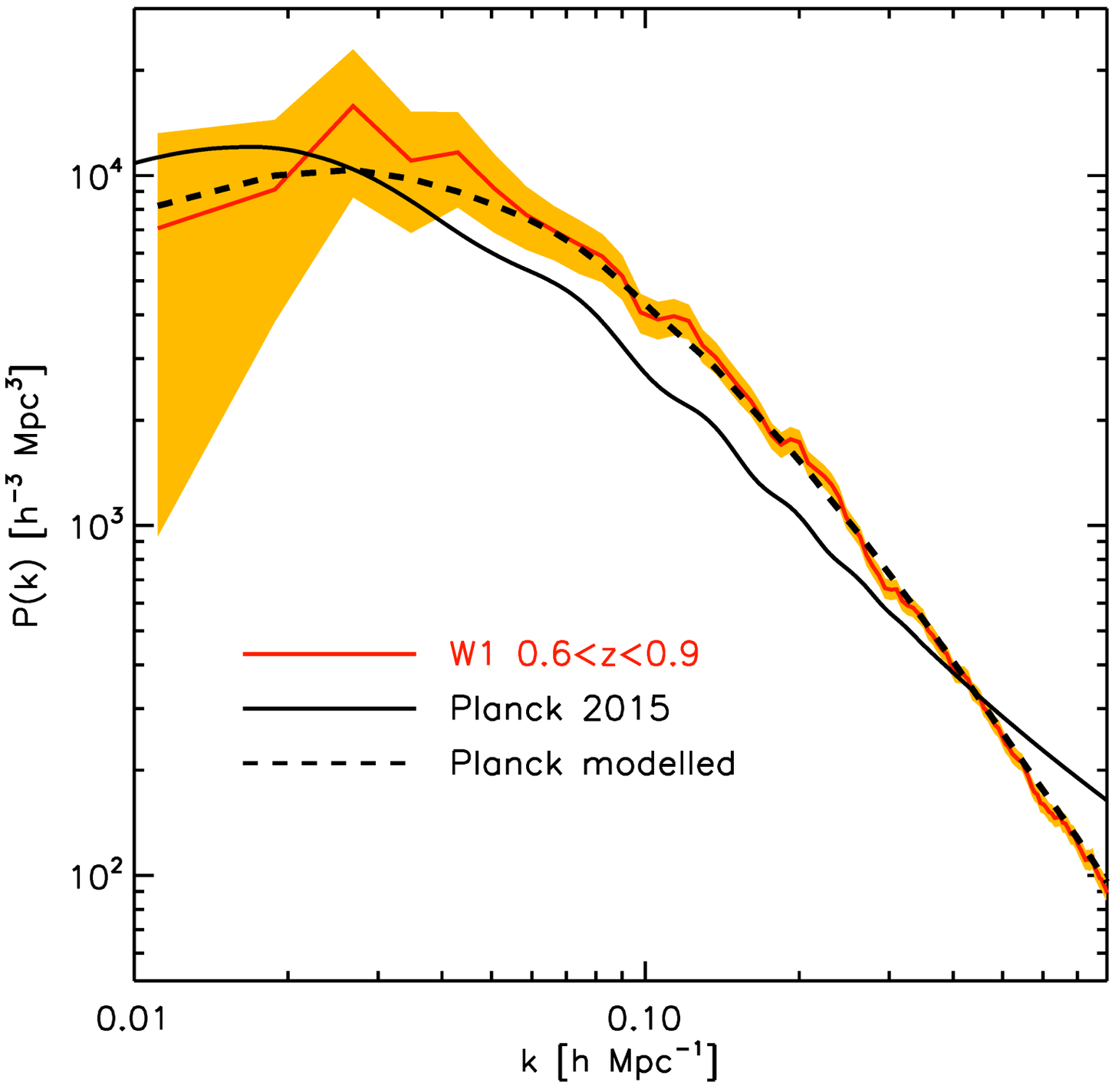
redshift space distortions



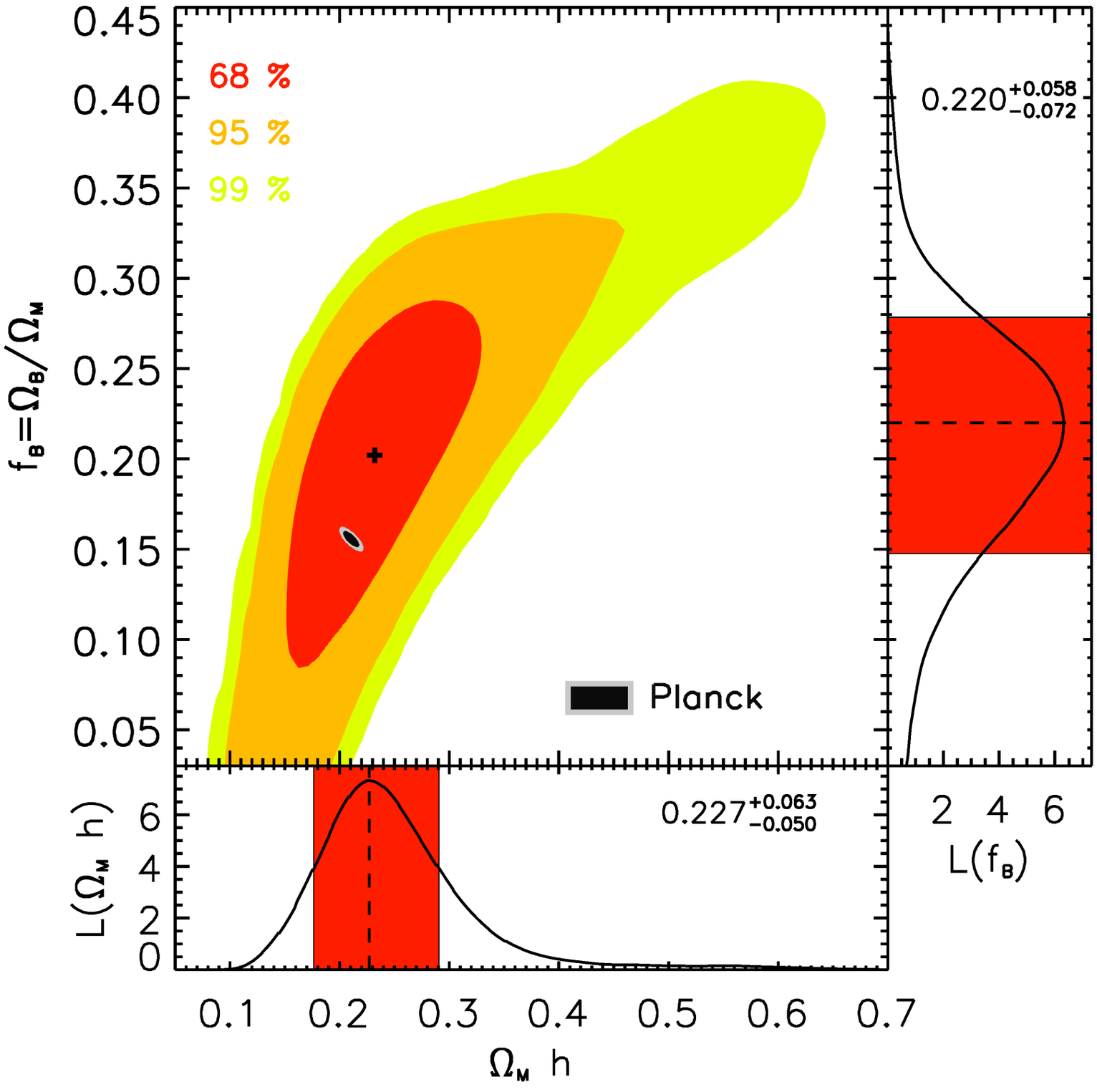
Observation VS Theory



Observation VS Theory

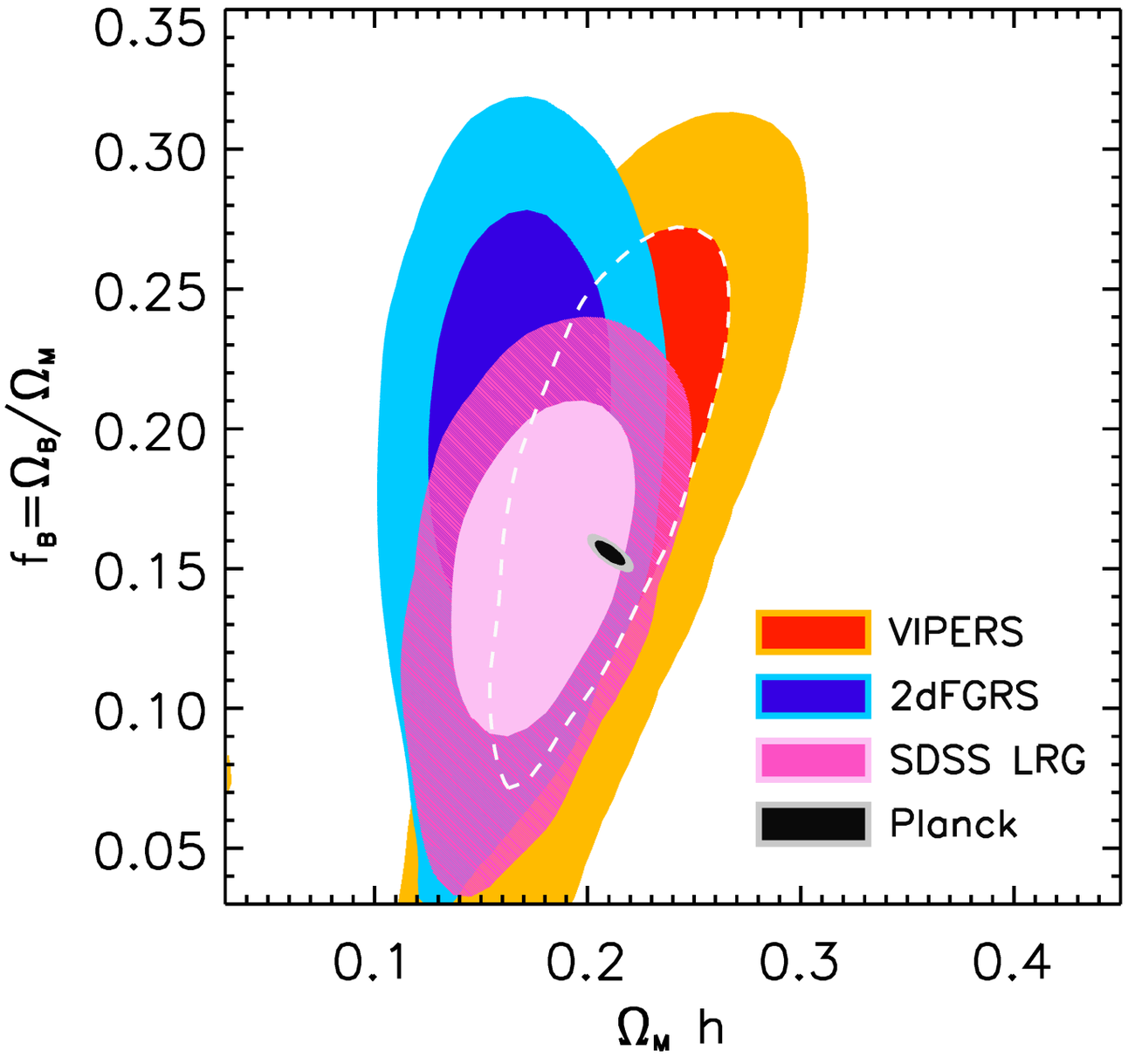


Results

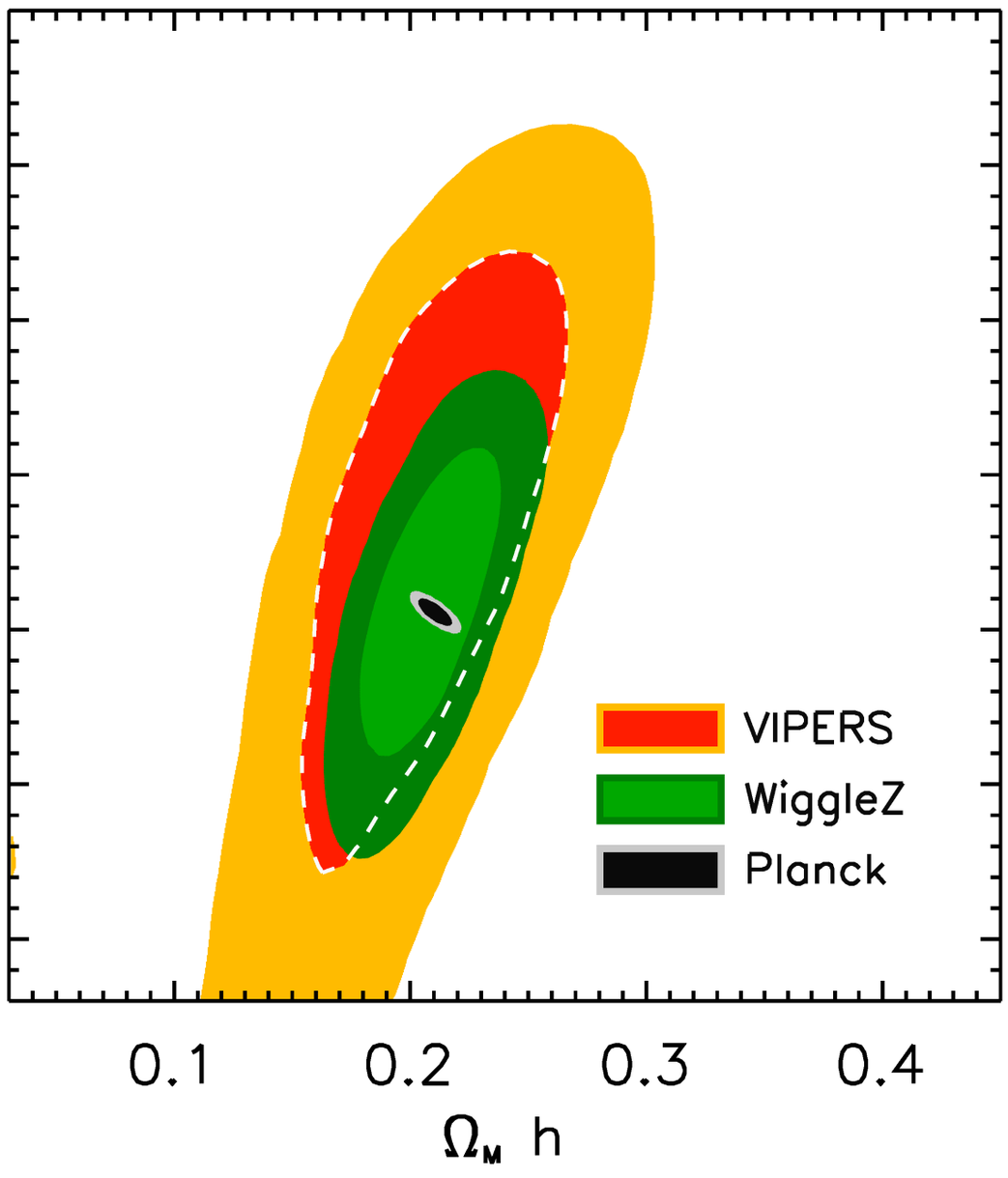

68 %
95 %
99 %
Planck
$0.220^{+0.058}_{-0.072}$
$0.227^{+0.063}_{-0.050}$
$f_B=\Omega_B/\Omega_M$
$L(\Omega_M\ h)$
$L(f_B)$
$\Omega_M\ h$
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0
2
4
6
0.1
0.2
0.3
0.4
0.5
0.6
0.7

Comparison with other surveys

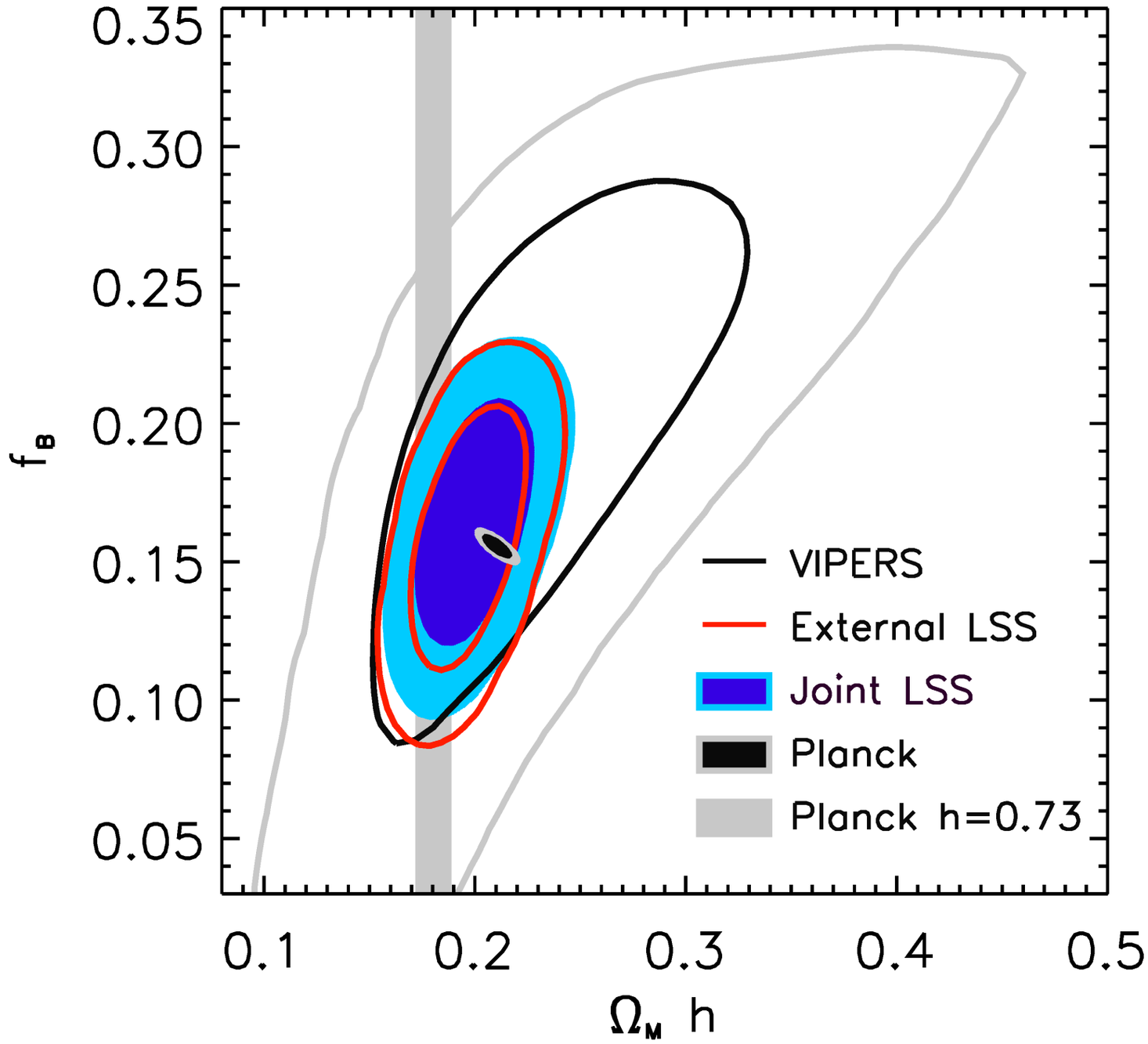
LOW redshift

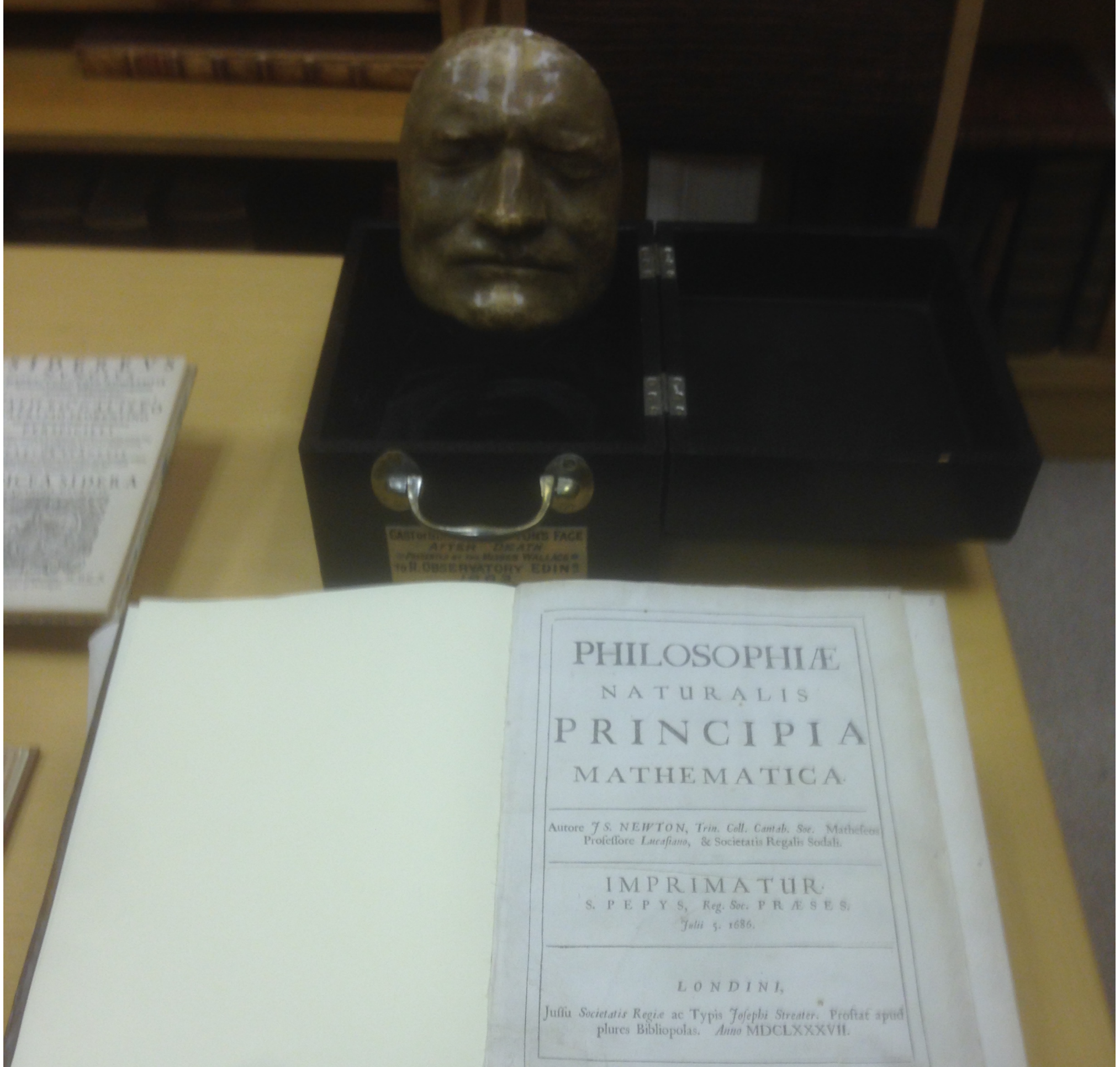


HIGH redshift



Large Scale Structure joint likelihood




PHILOSOPHIÆ
NATURALIS
PRINCIPIA
MATHEMATICA
Autore J. S. NEWTON, Trin. Coll. Cantab. Soc. Matheseos Professore Lucasiano, & Societatis Regalis Sodali.
IMPRIMATUR
S. PEPYS, Reg. Soc. PRÆSES.
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LONDINI,
Jussu Societatis Regiæ ac Typis Josephi Streater. Prostat apud plures Bibliopolas. Anno MDCLXXXVII.