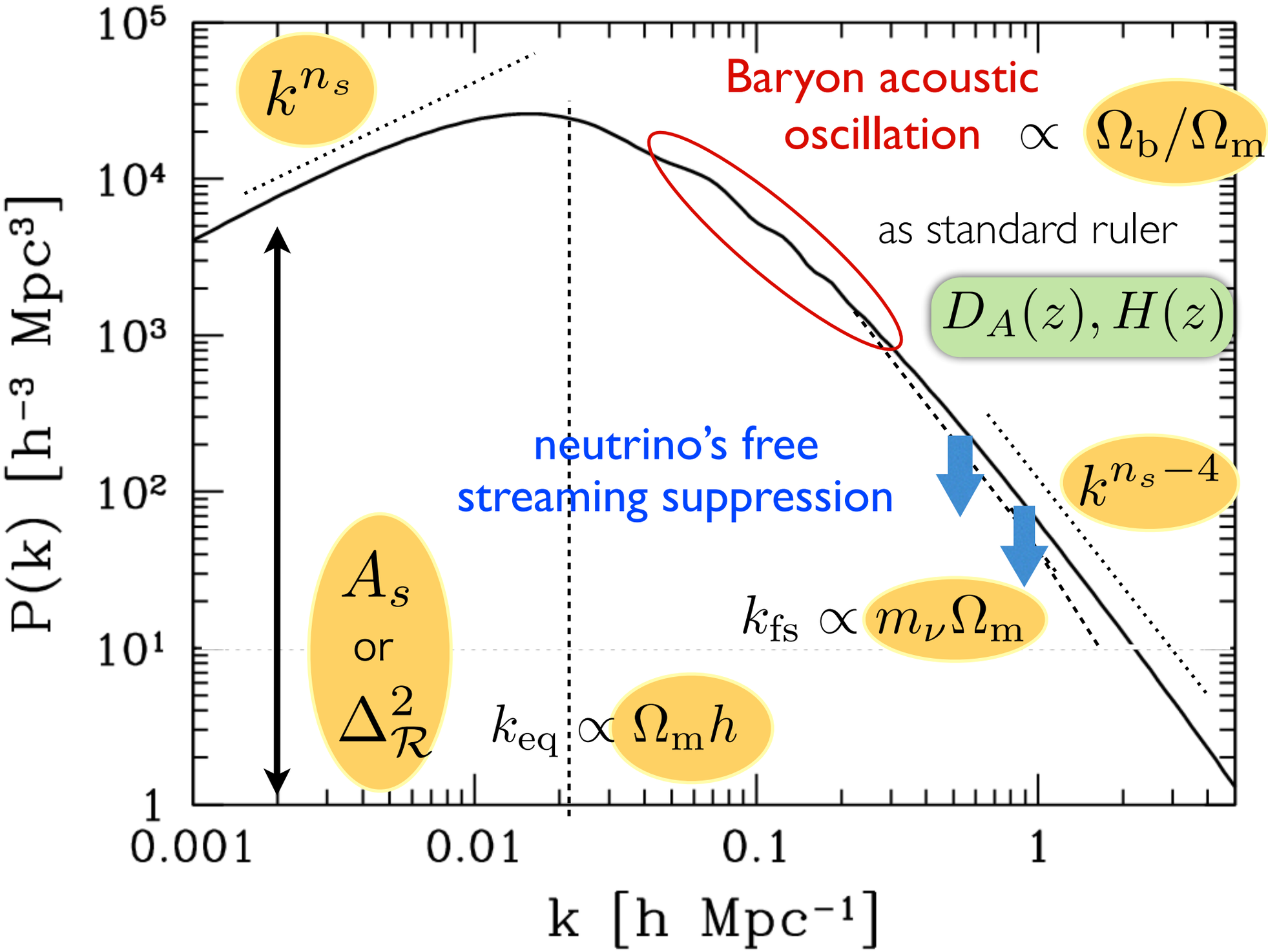
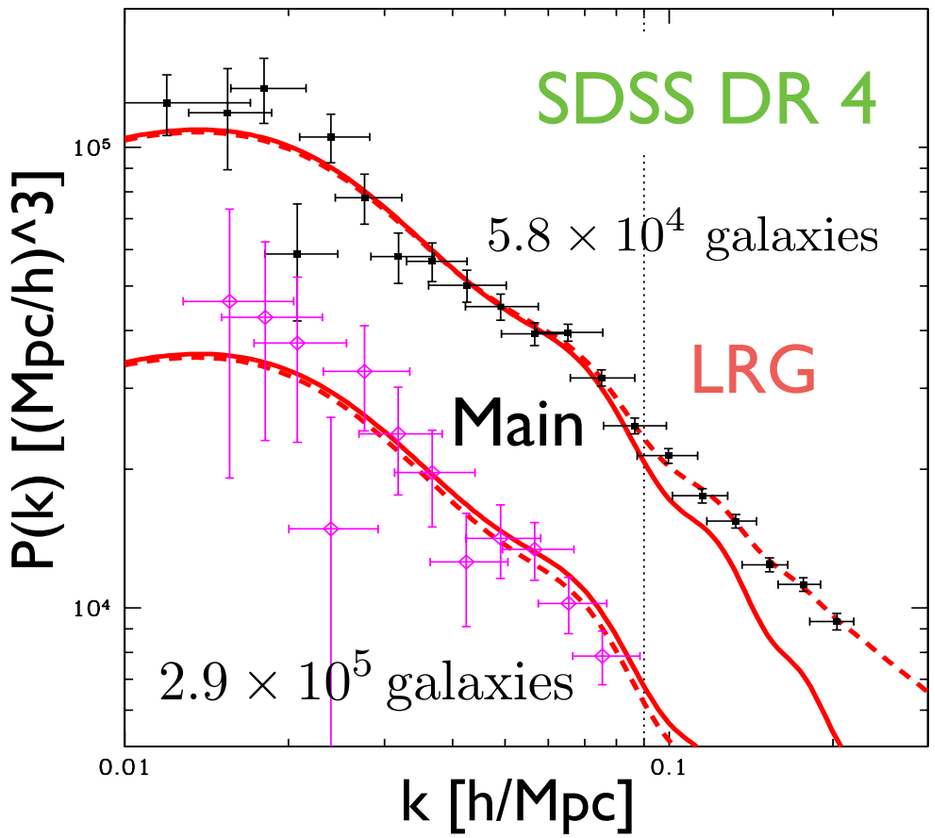
Linear theory of structure formation

(Linear) matter power spectrum

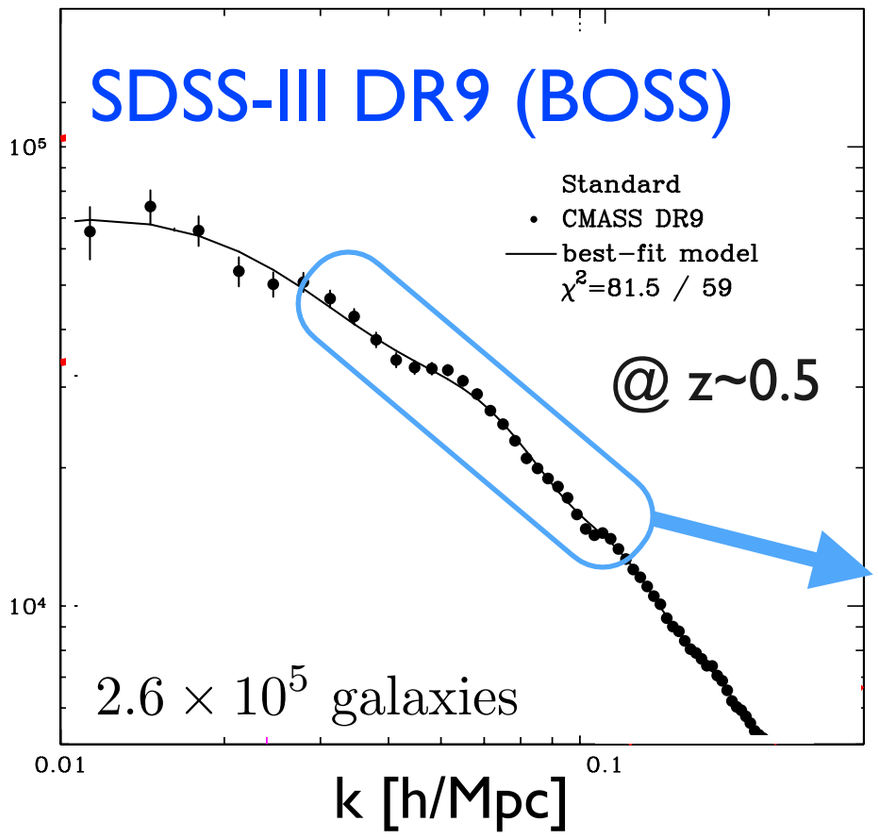


Galaxy power spectrum

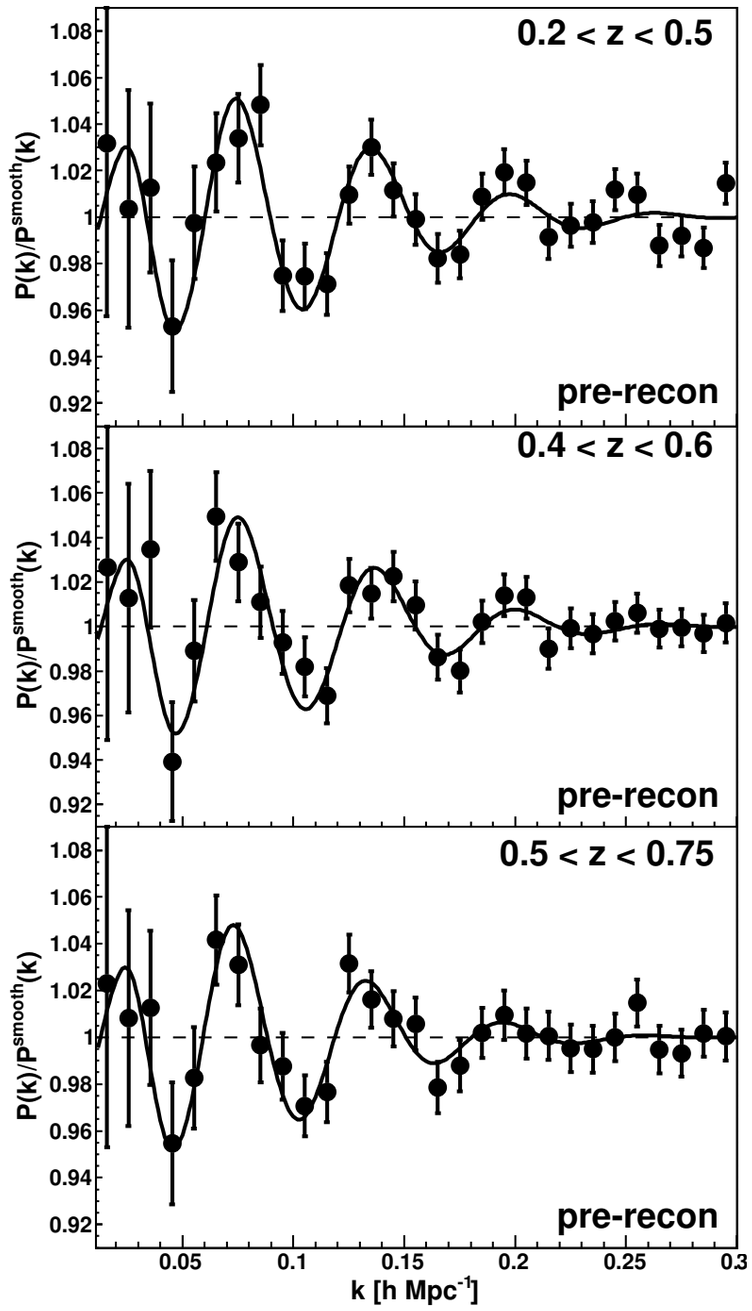
Tegmark et al. ('06)



Anderson et al. ('12)



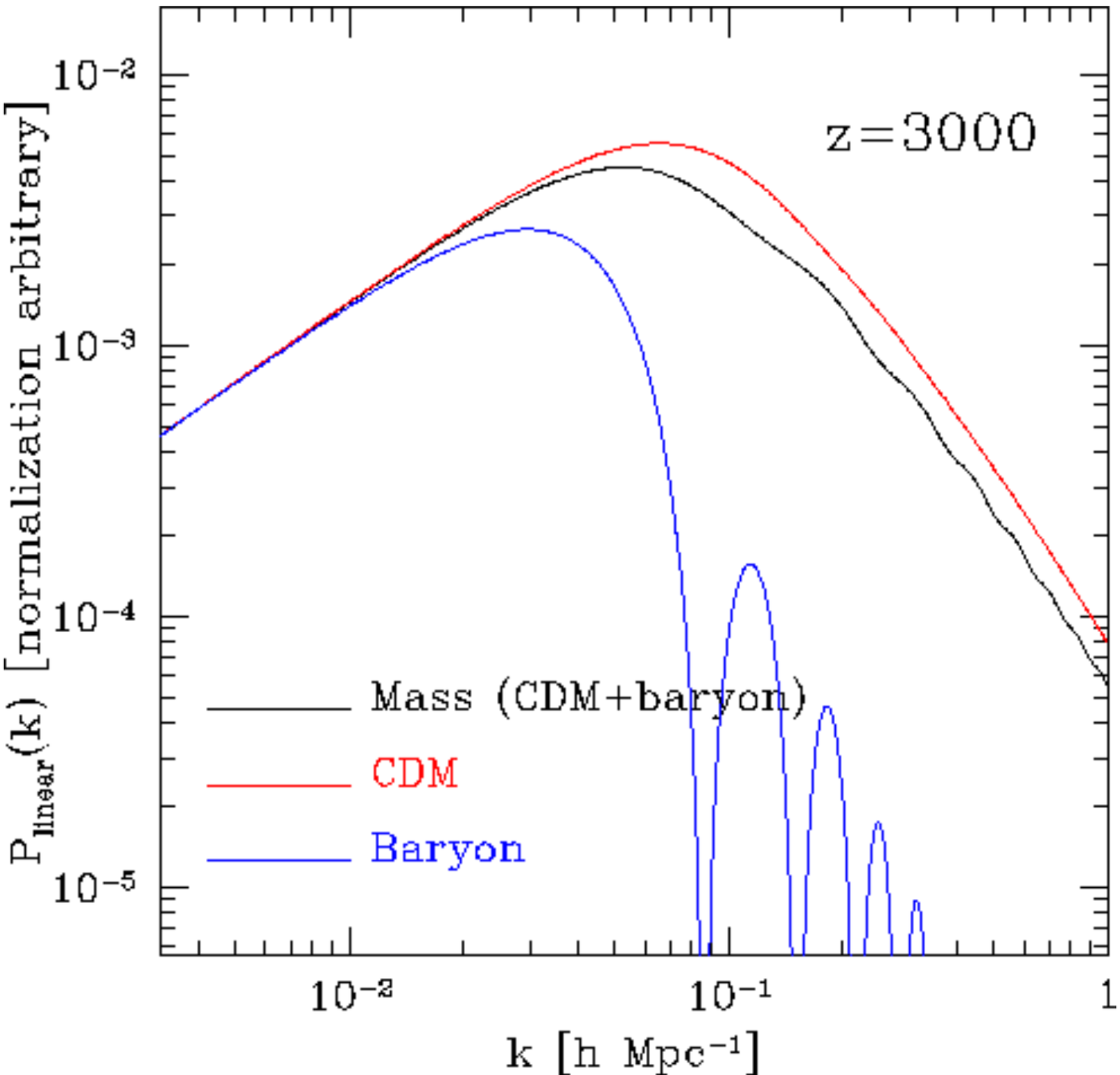
Beutler et al. ('16)



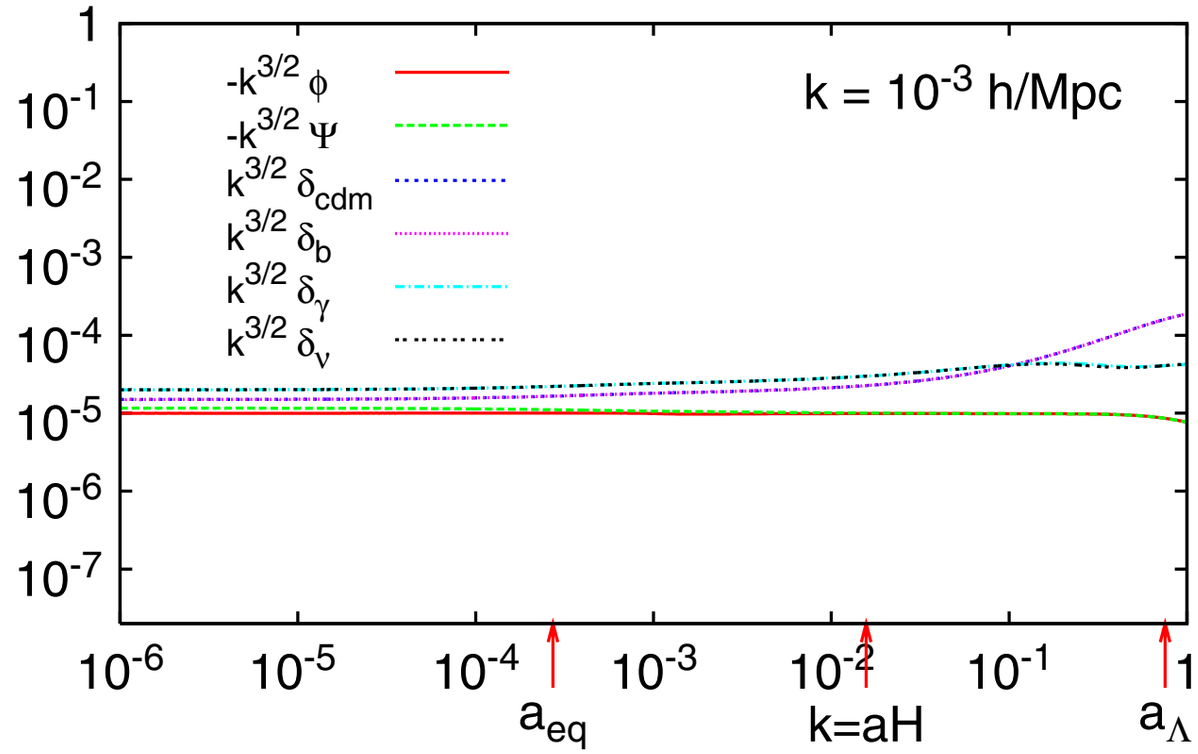
SDSS-III DR12 (BOSS)

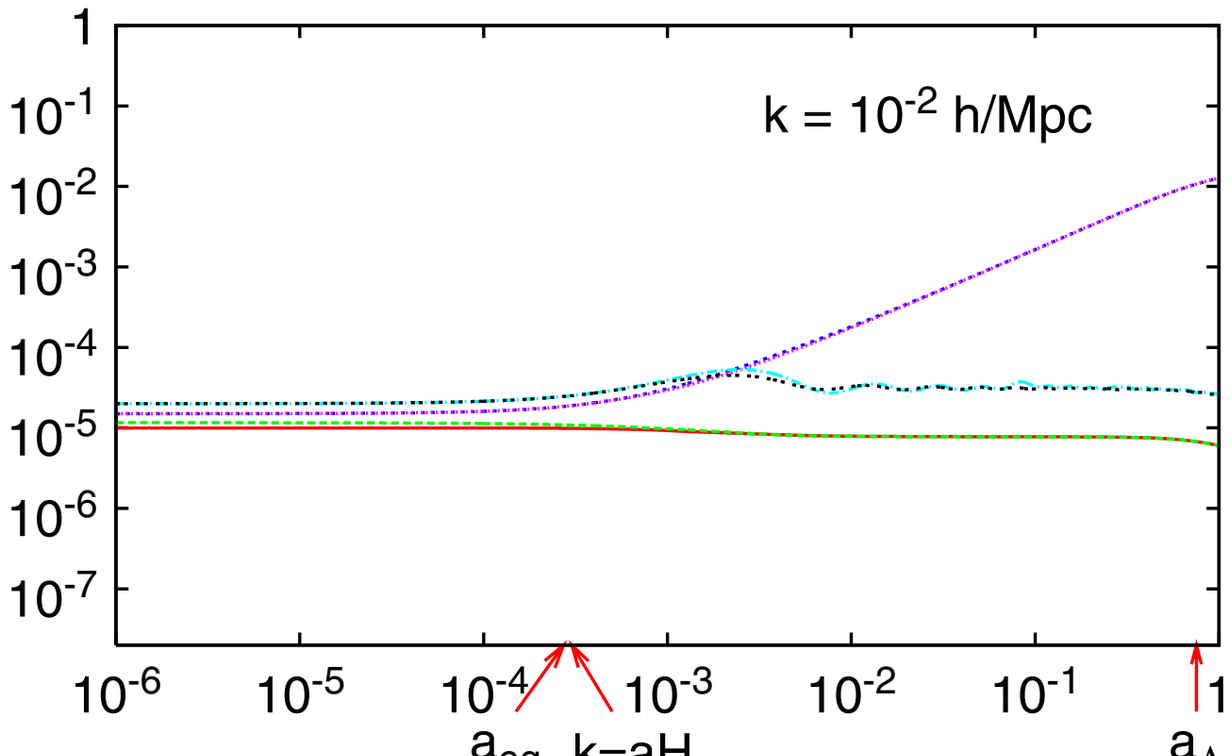
1.2×10^6 galaxies

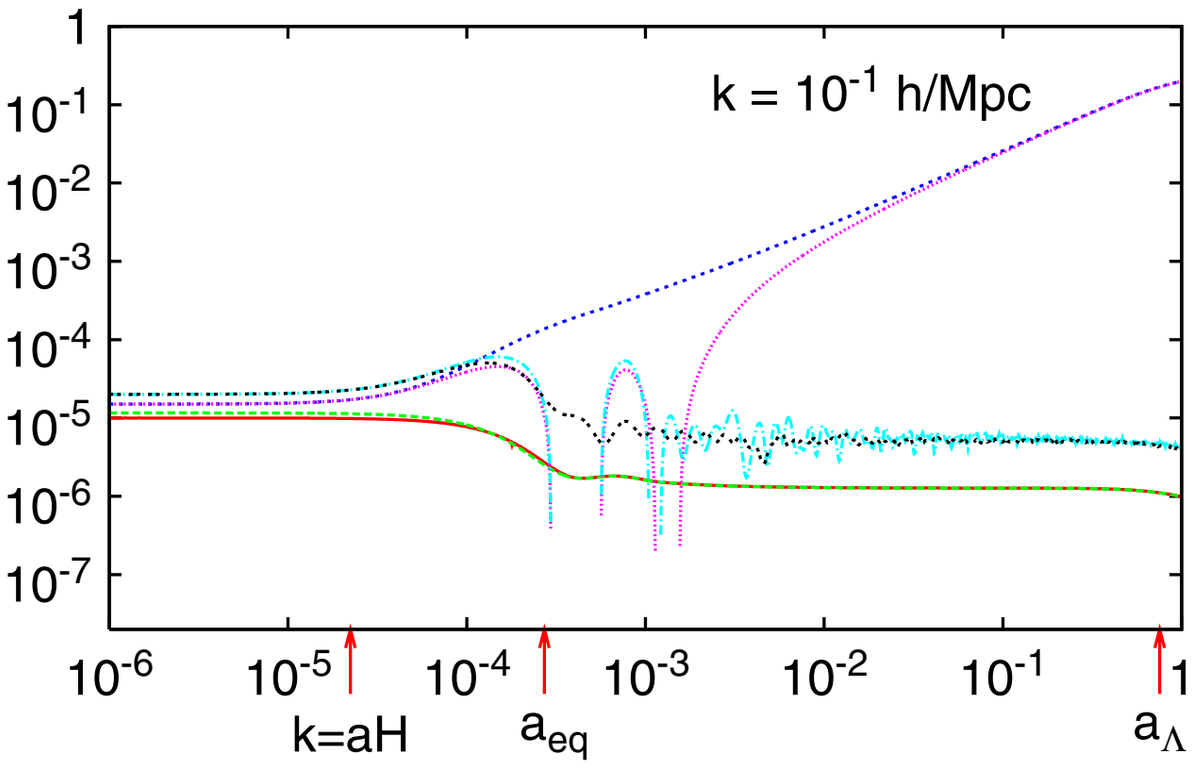
Evolution of power spectrum

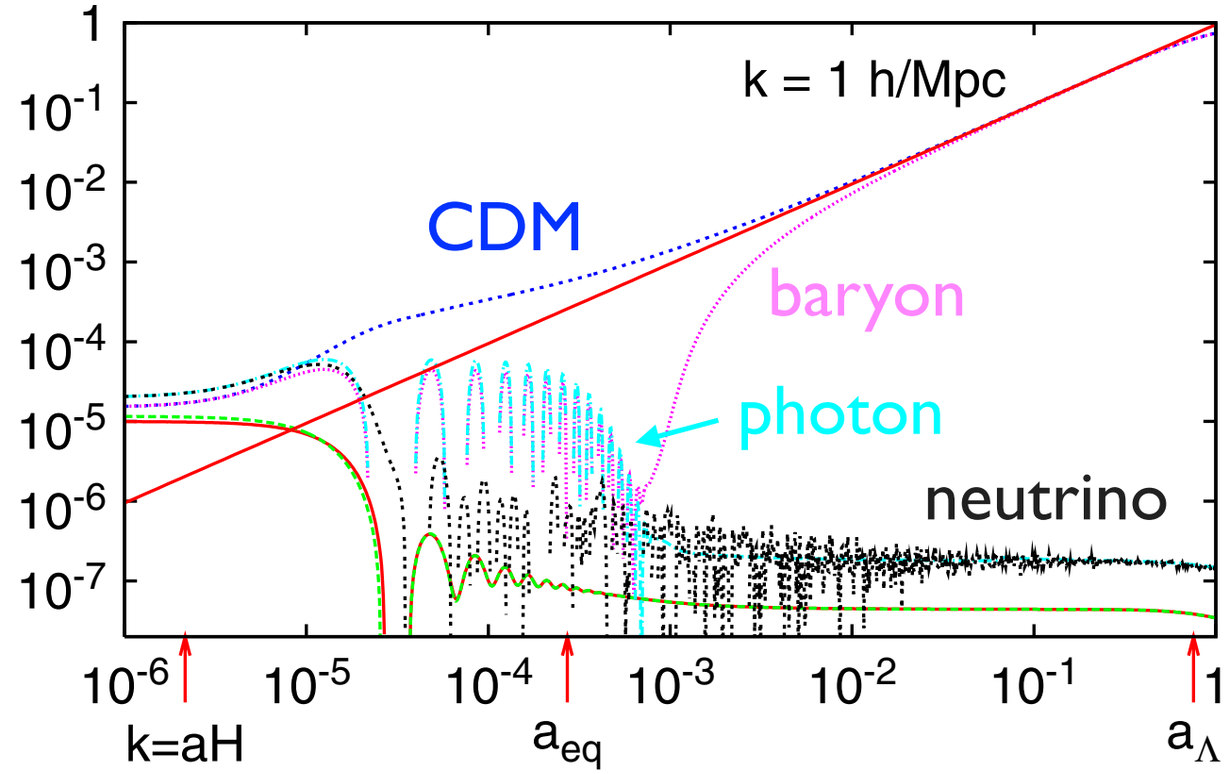


ΛCDM (massless neutrino)



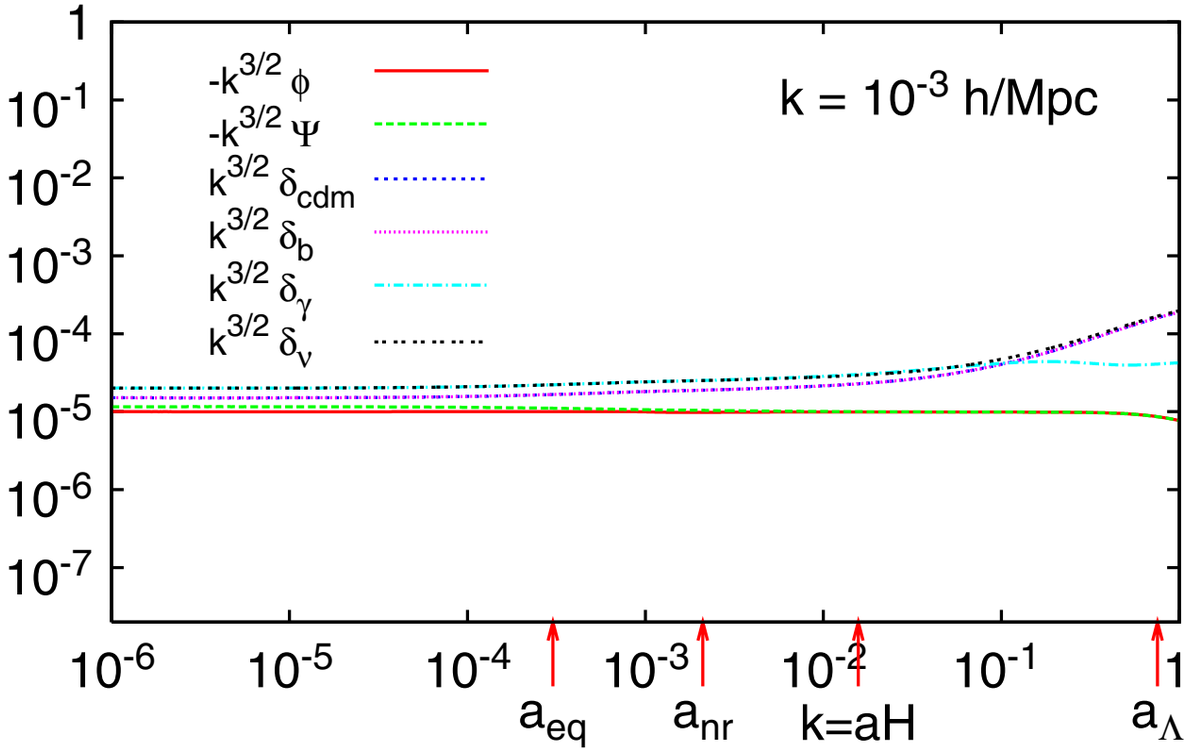


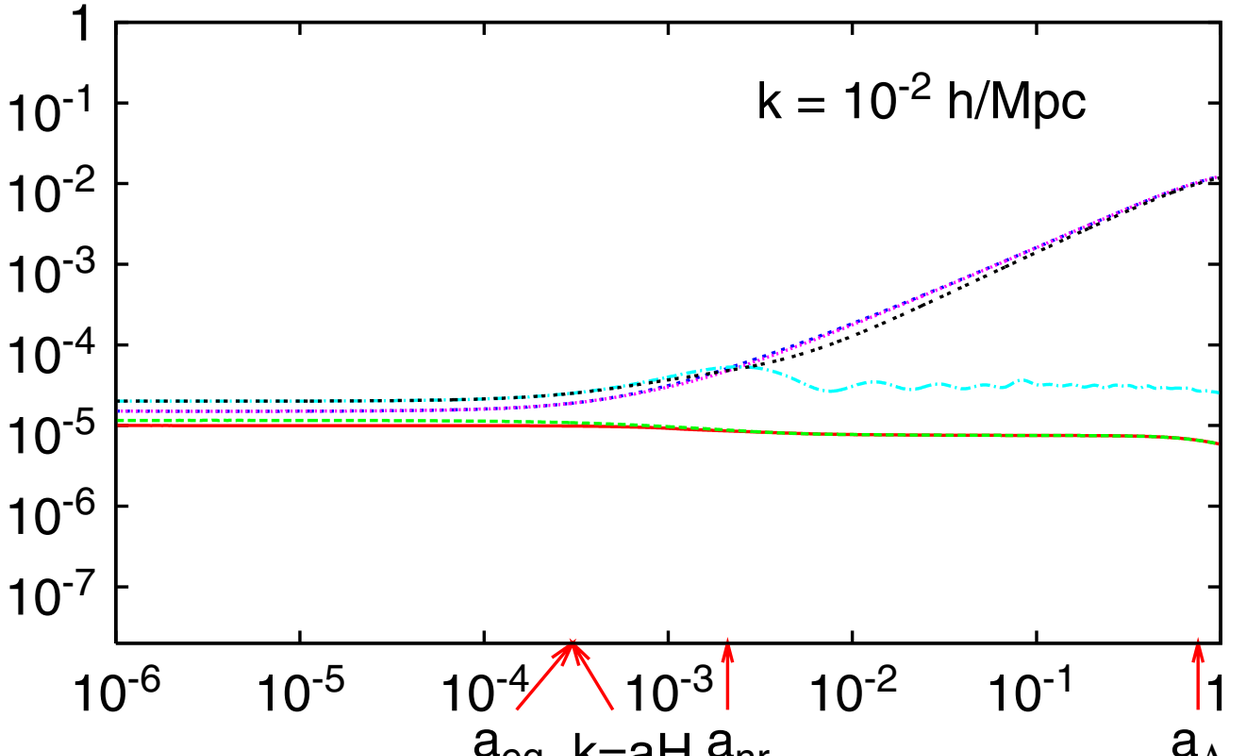


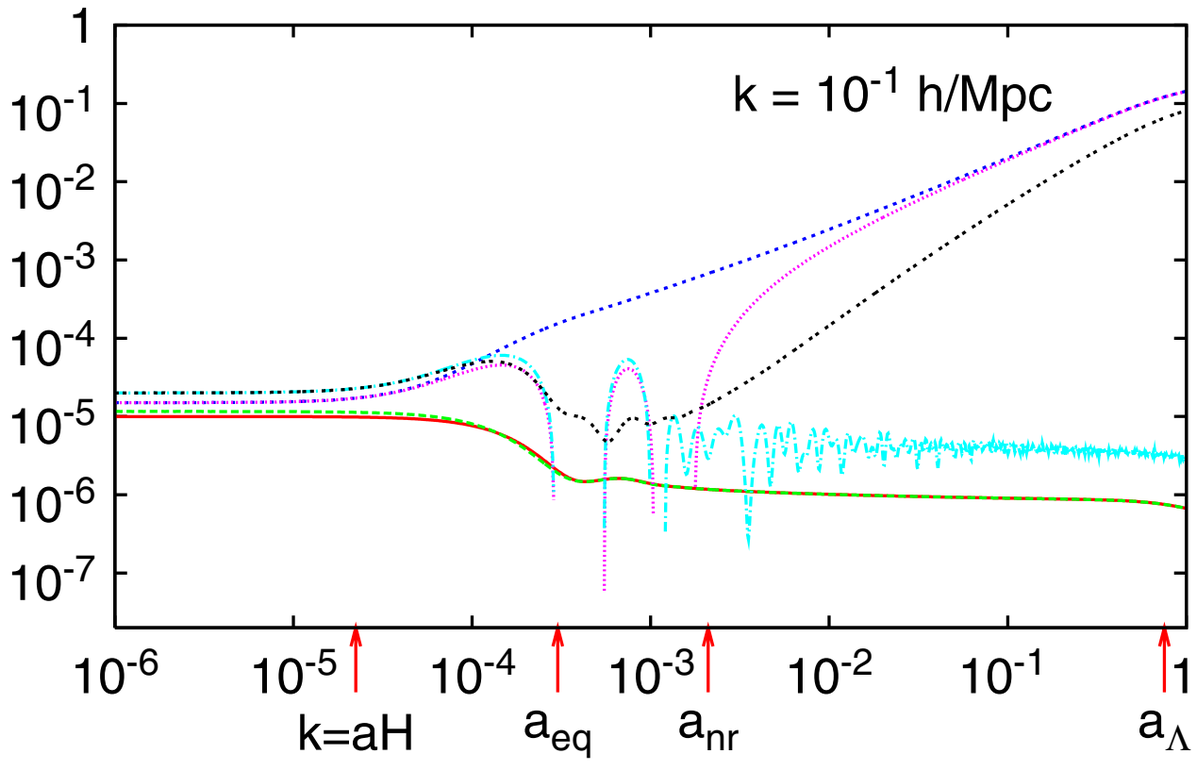


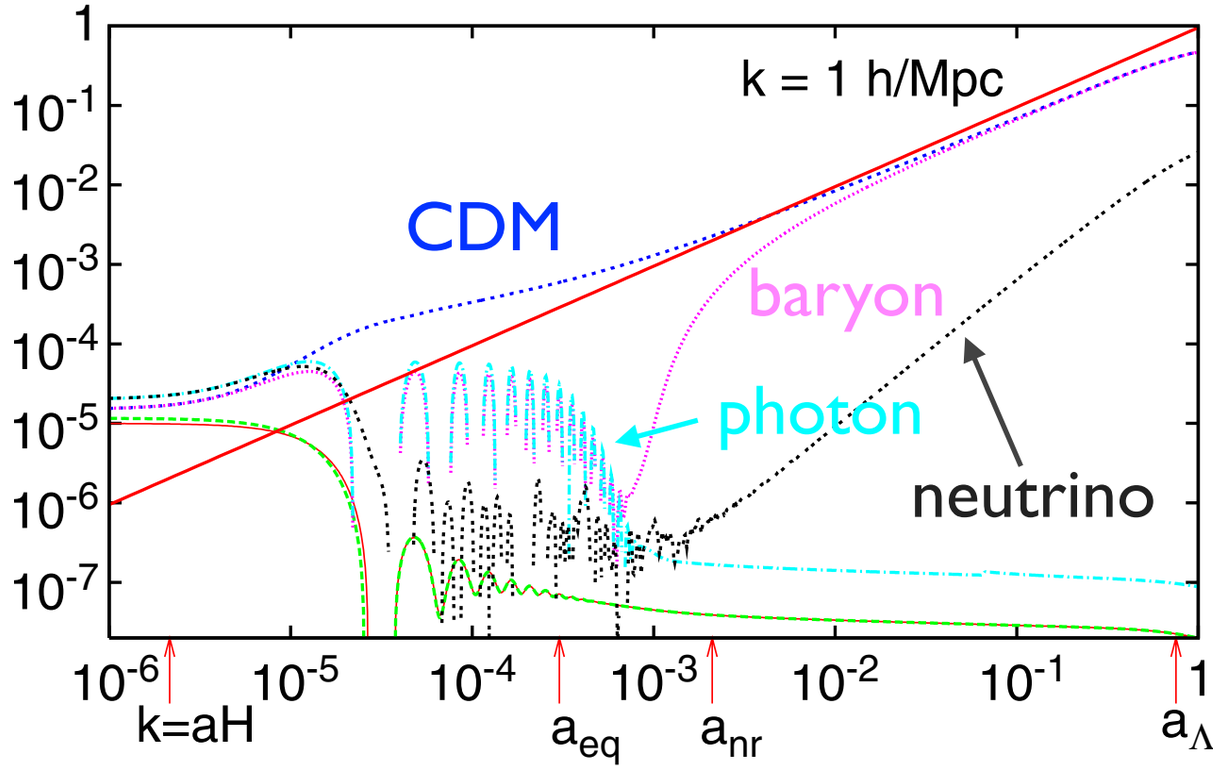
Lesgourgues & Pastor, Phys.Rep. 429 ('06) 307

ΛMCDM (massive neutrino) $(f_\nu = 0.1)$



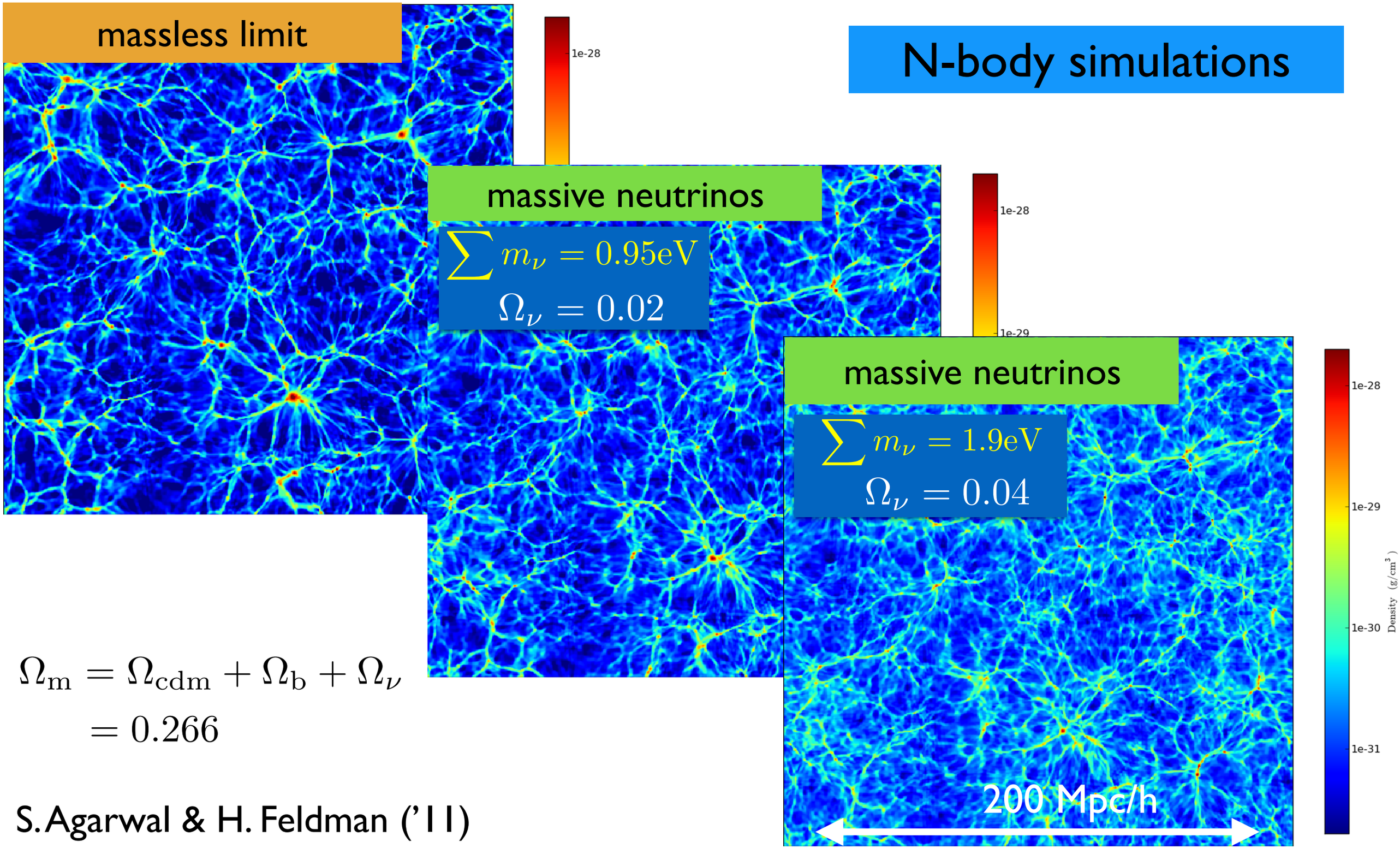






Lesgourgues & Pastor, Phys.Rep. 429 ('06) 307

Impact on large-scale structure



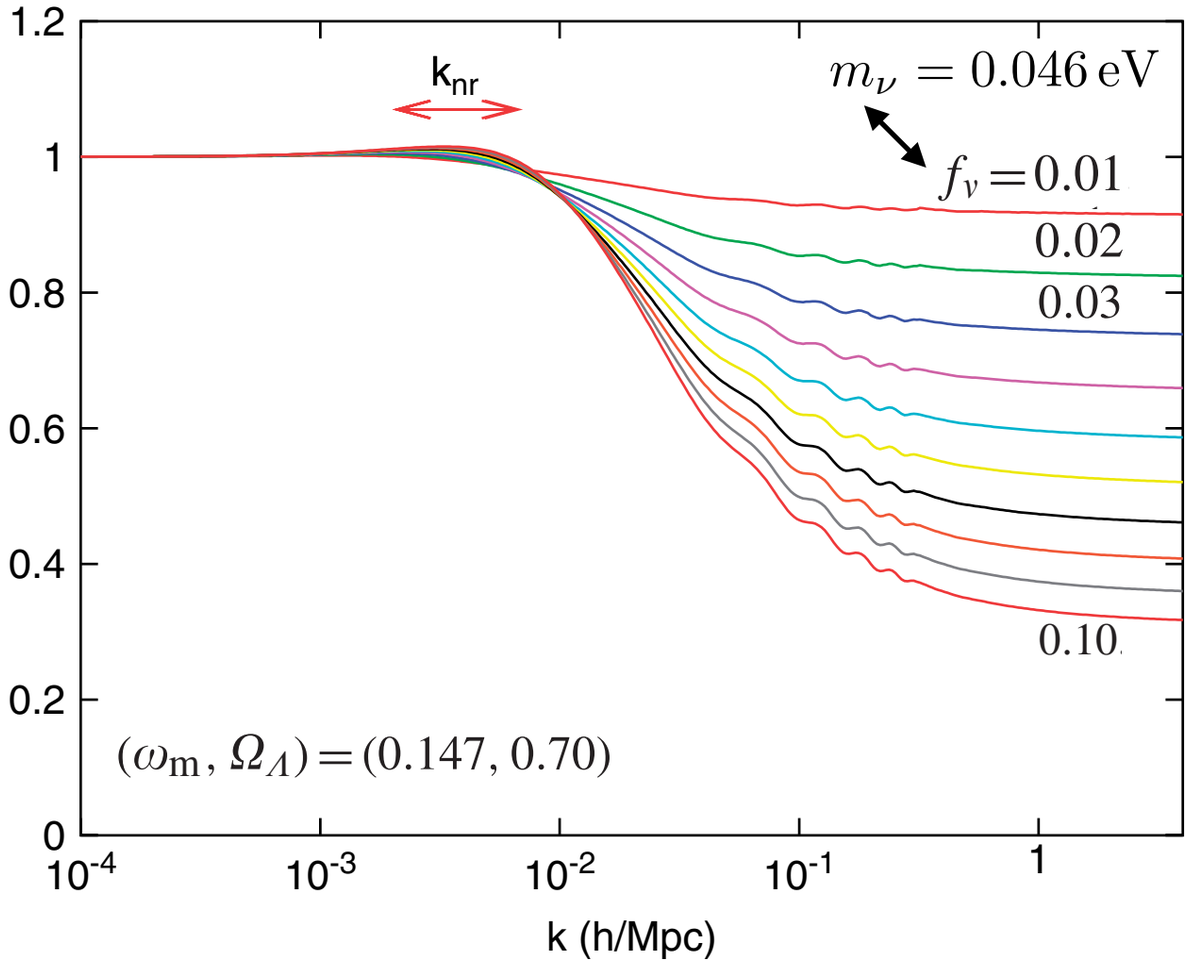
$$\Omega_{\mathrm{m}} = \Omega_{\mathrm{cdm}} + \Omega_{\mathrm{b}} + \Omega_\nu$$
$$= 0.266$$

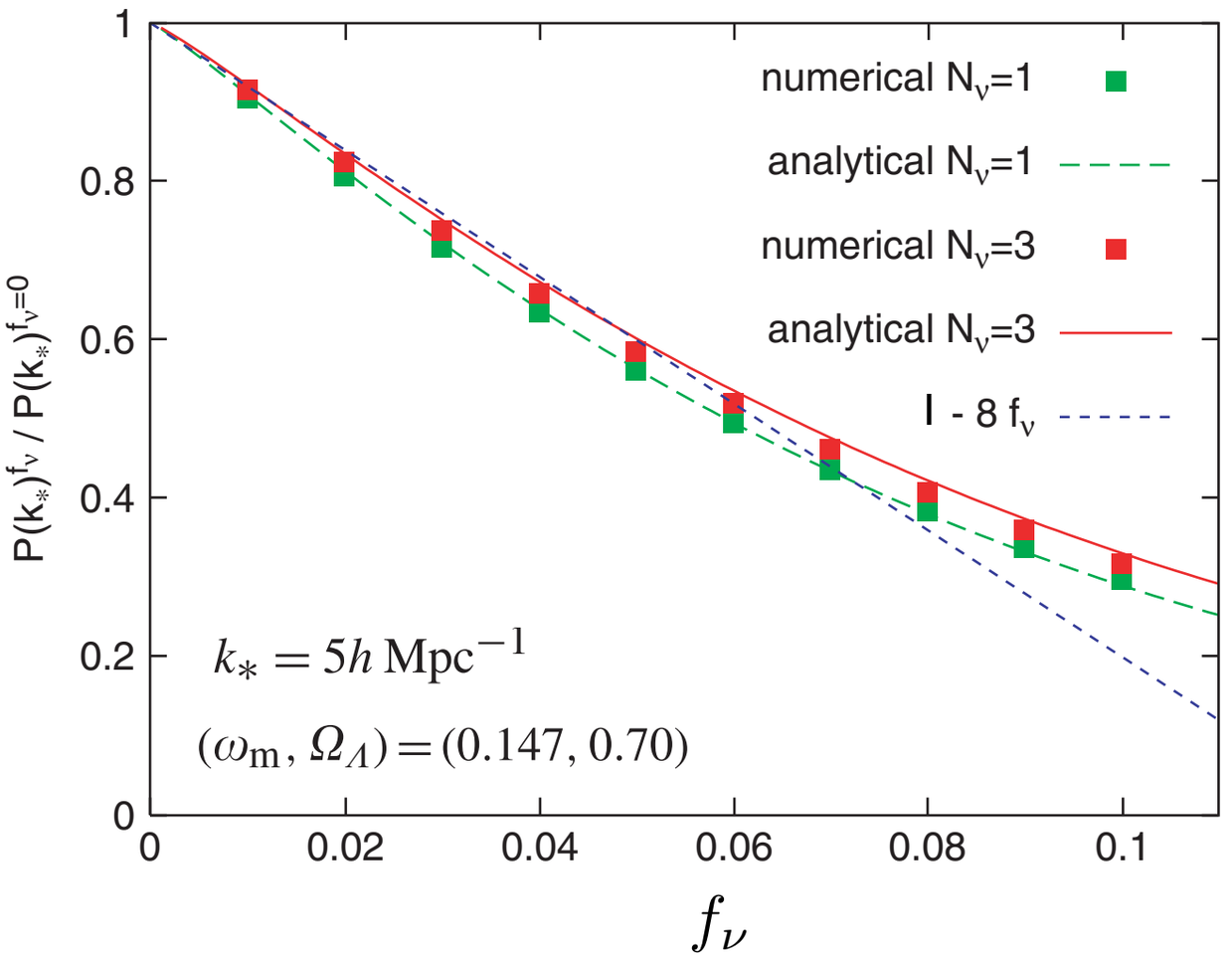
S. Agarwal & H. Feldman ('11)

ν's free-streaming suppression

$$k_{\rm FS} = \frac{0.677}{(1+z)^2}\frac{m_\nu}{1\,{\rm eV}}\sqrt{\Omega_{\rm m,0}(1+z)^3+\Omega_\Lambda}\;h\,{\rm Mpc}^{-1}$$

$$\frac{P(k)|_{f_\nu\neq 0}}{P(k)|_{f_\nu=0}} = (1-f_\nu)^3\left\{1.9\times 10^5\,\frac{\Omega_{\nu,0}h^2}{N_{\rm eff}}\,\frac{D_1(a)}{a}\right\}^{-(6/5)f_\nu}$$





Lesgourgues & Pastor,
Phys.Rep. 429 ('06) 307