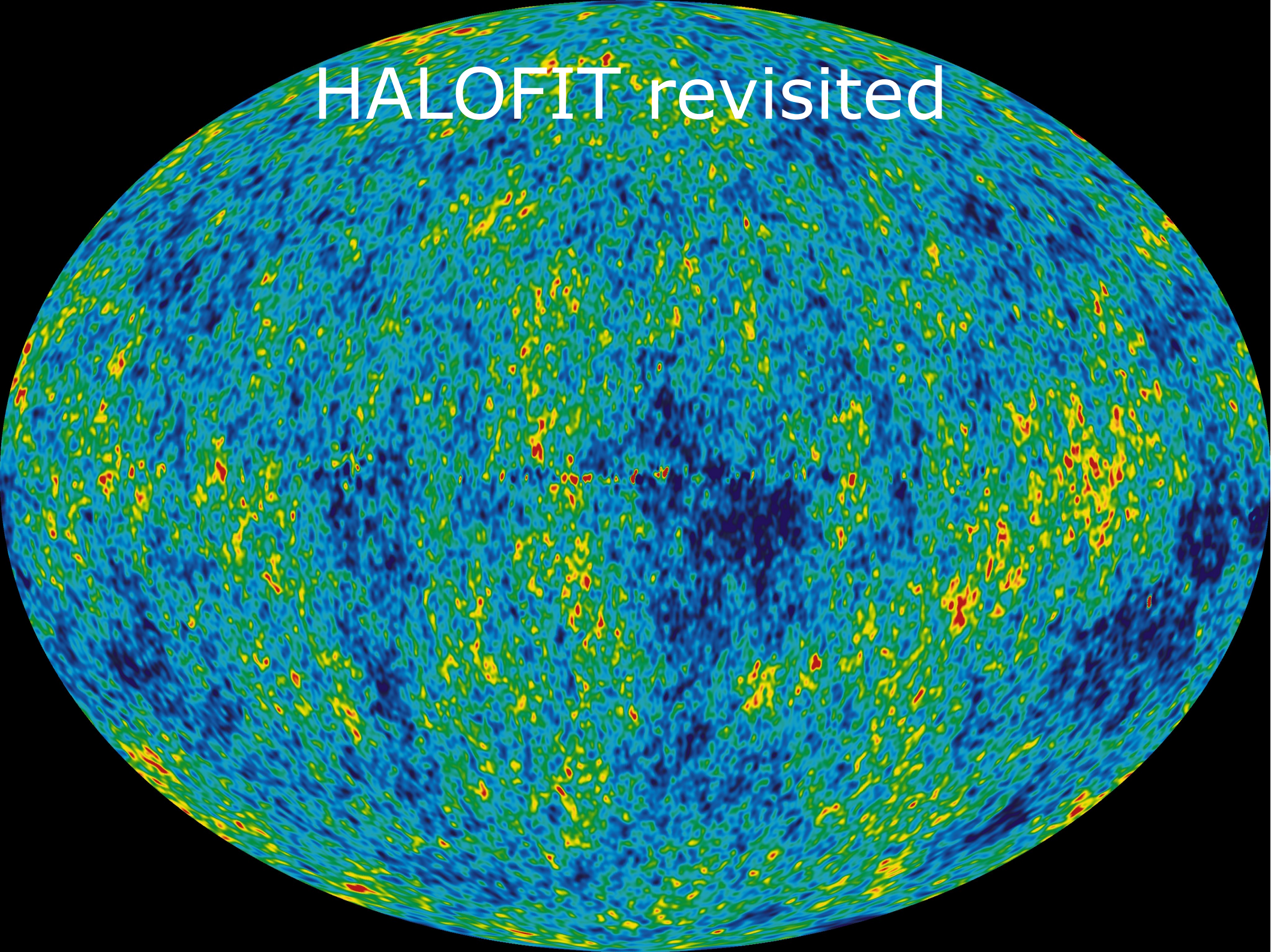
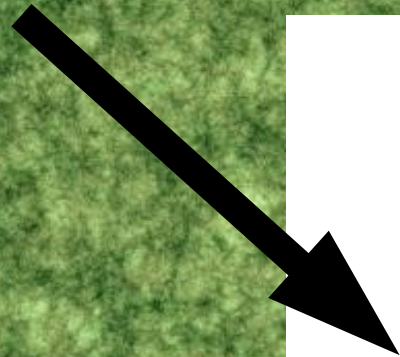


HALOFIT revisited

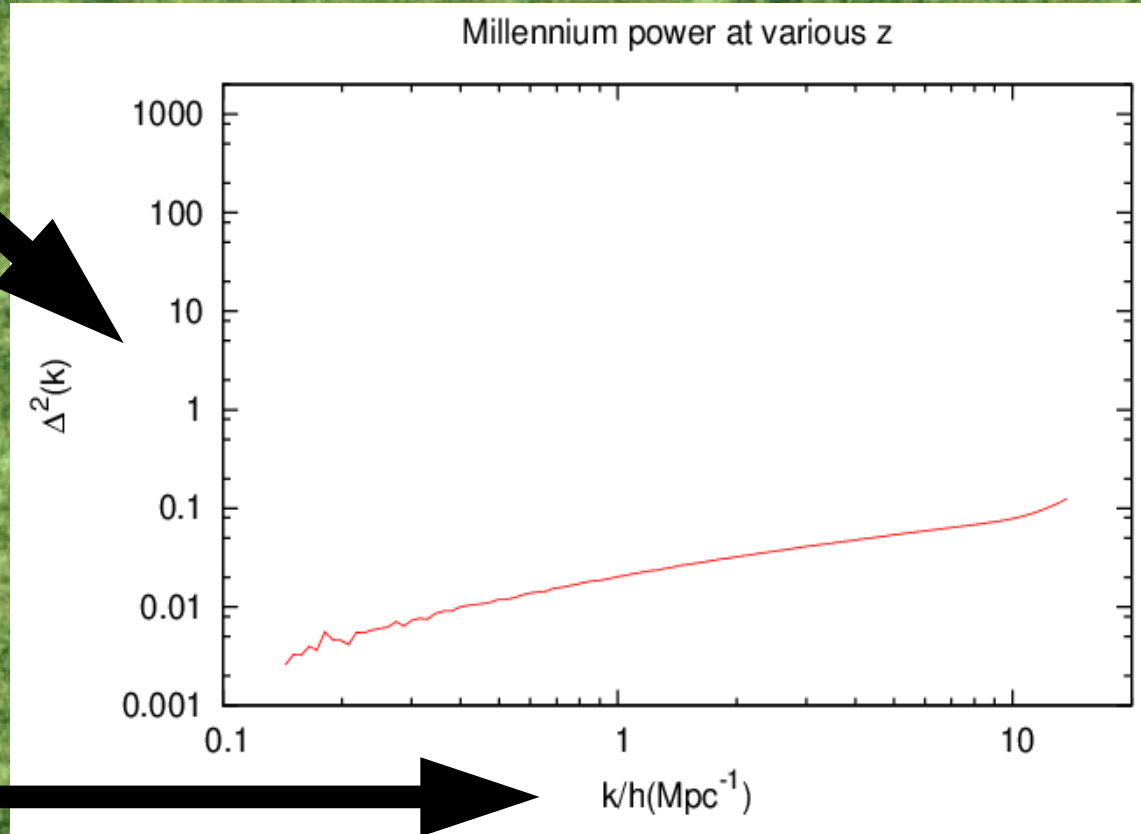


$z=18$

Contribution to variance

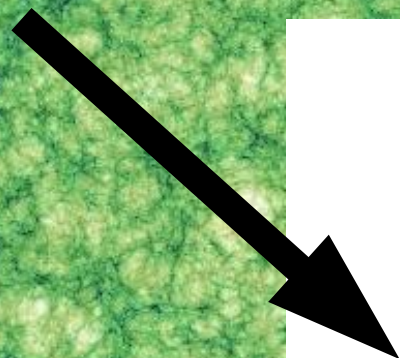


Scale

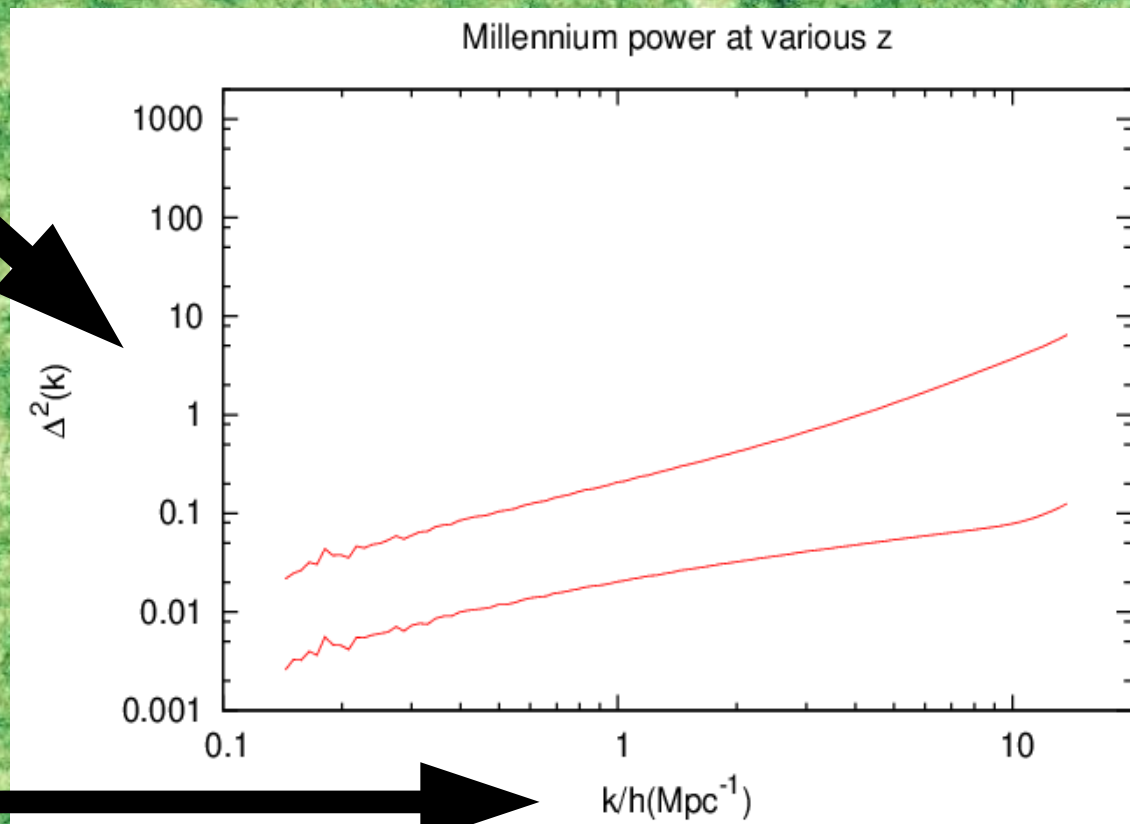


$z=6$

Contribution to variance

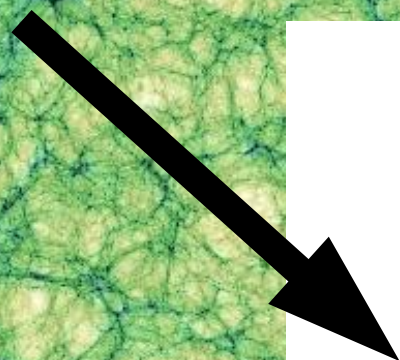


Scale

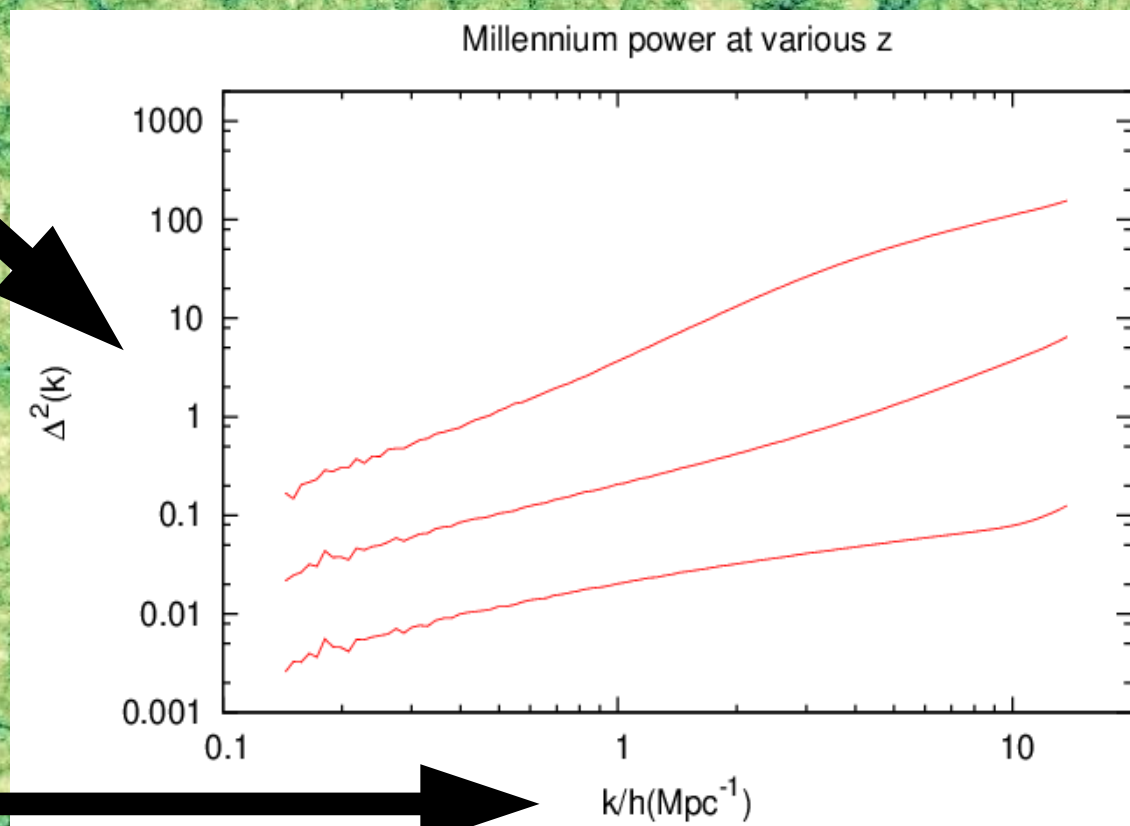


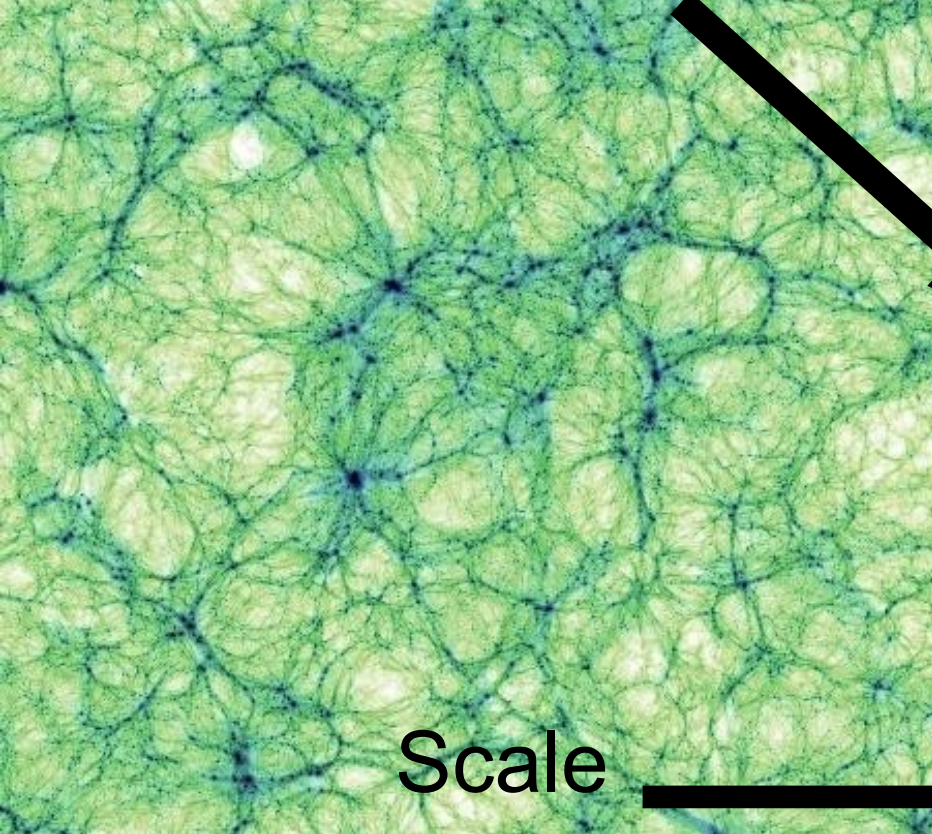
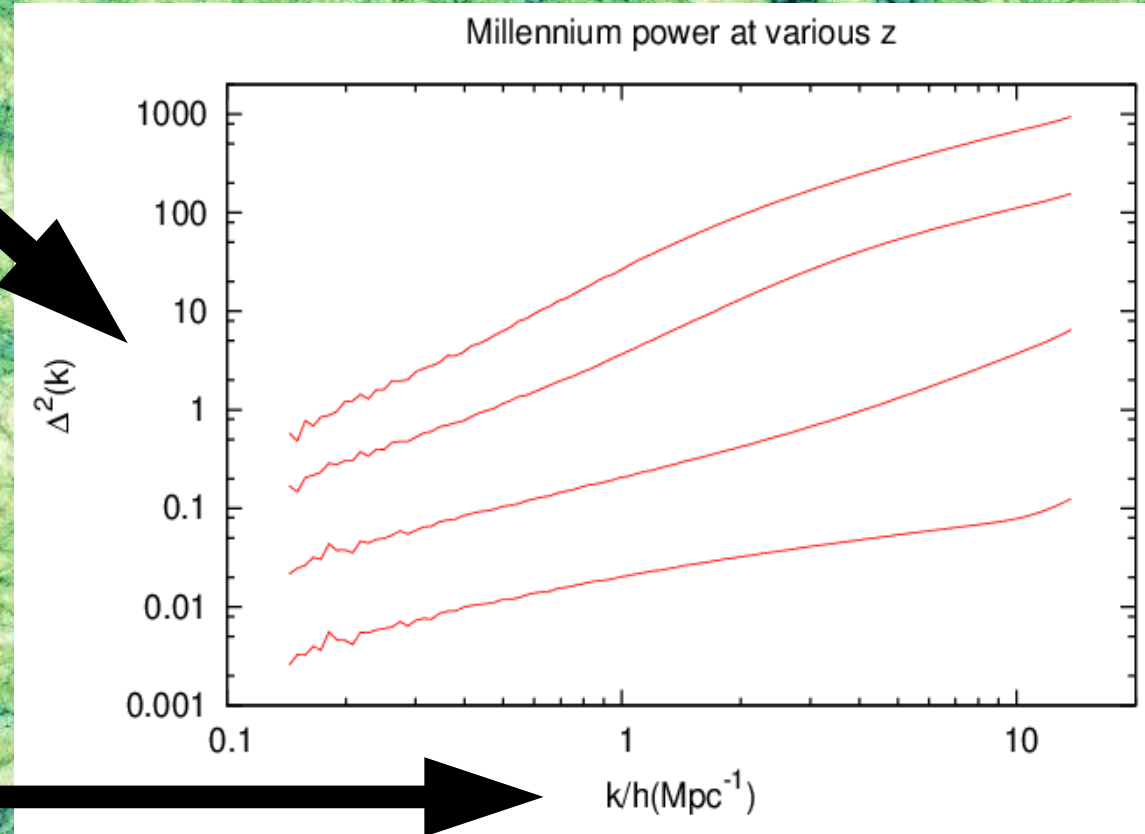
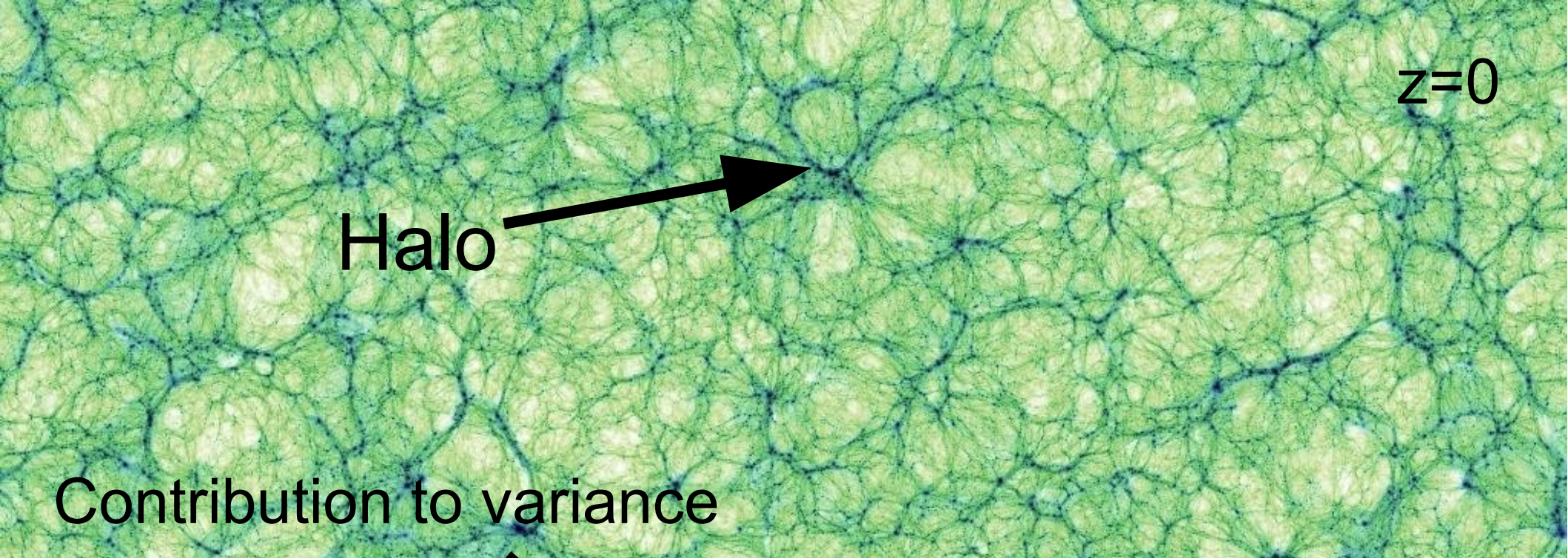
$z=1$

Contribution to variance

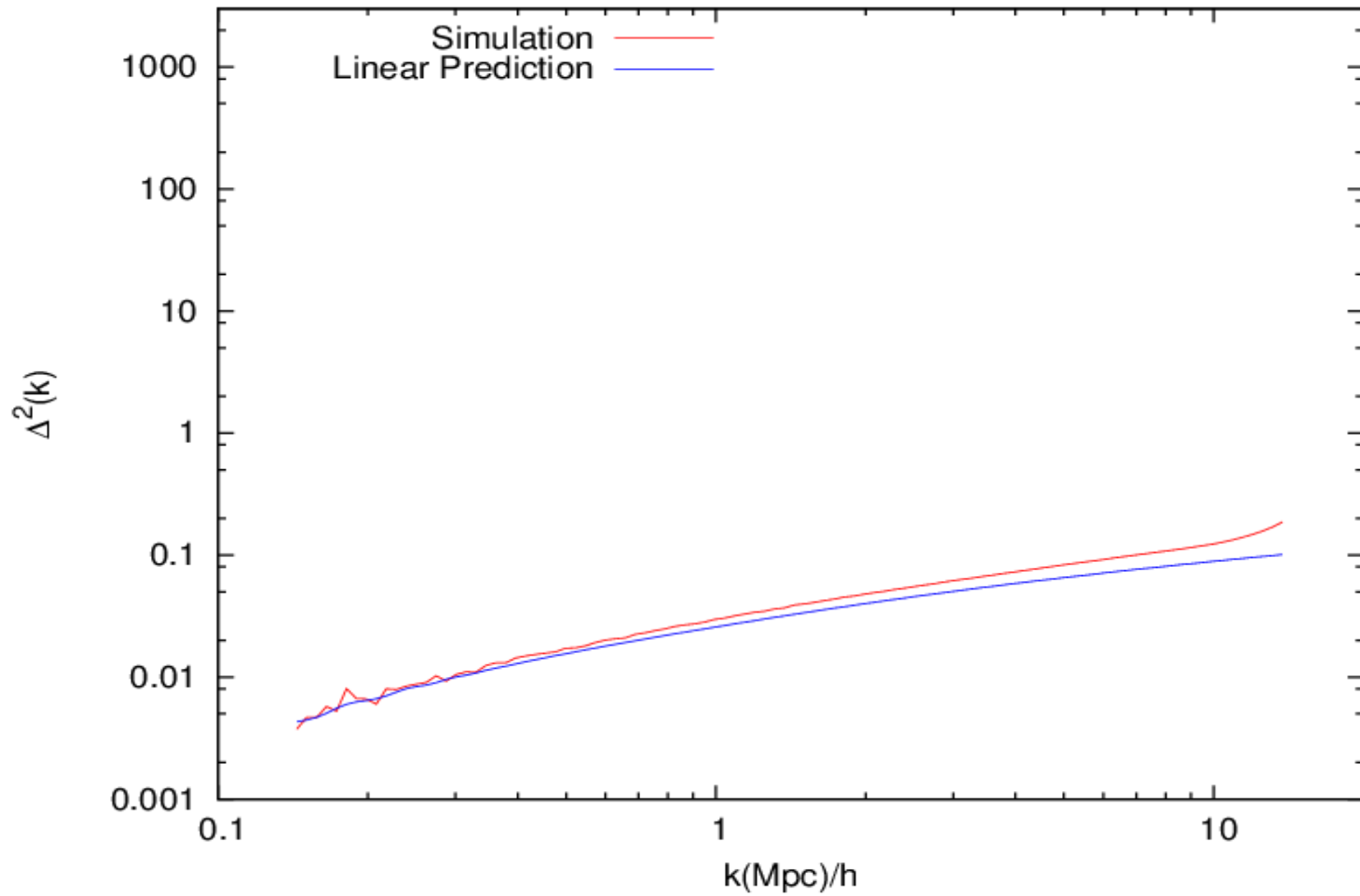


Scale

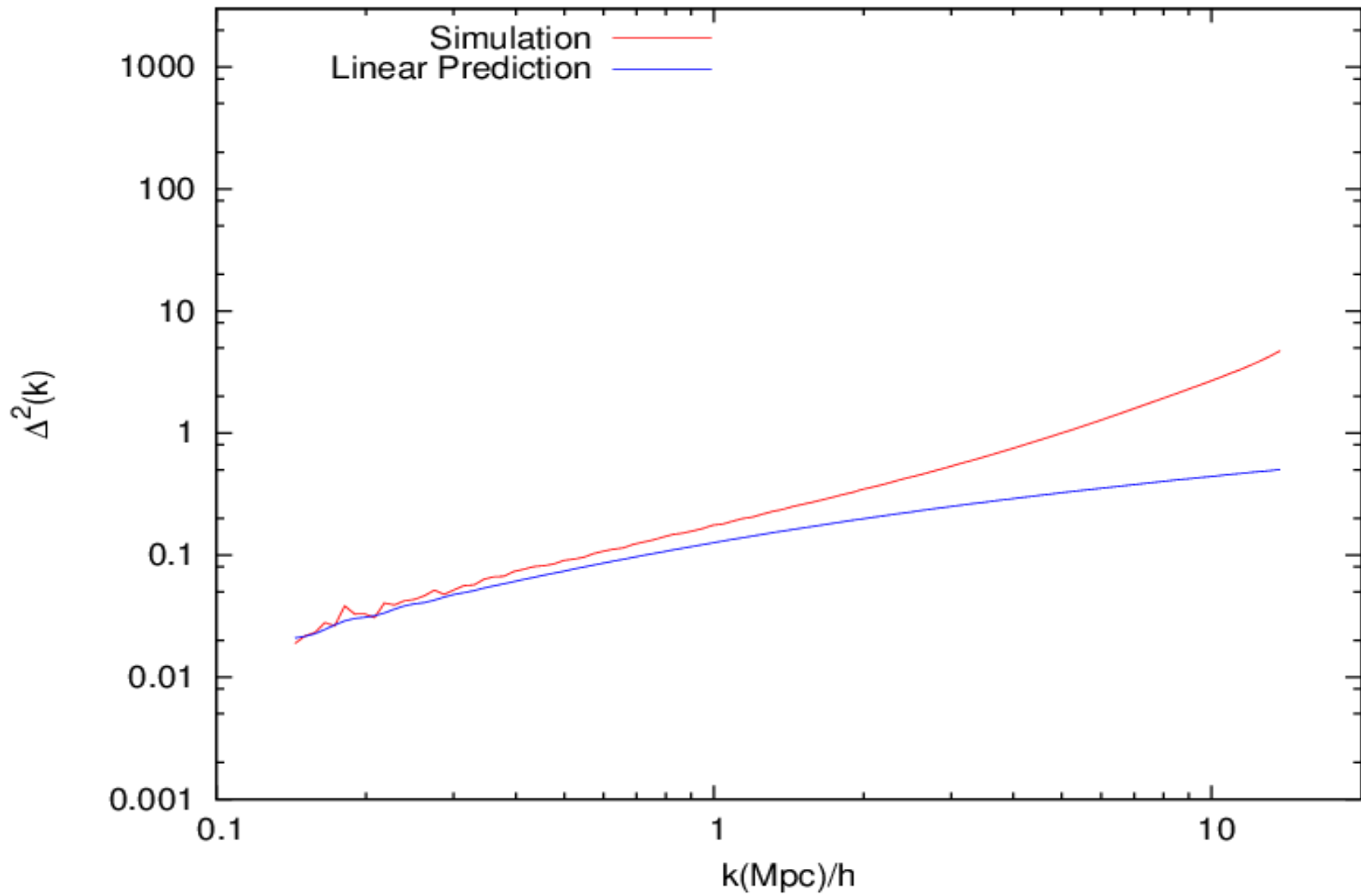




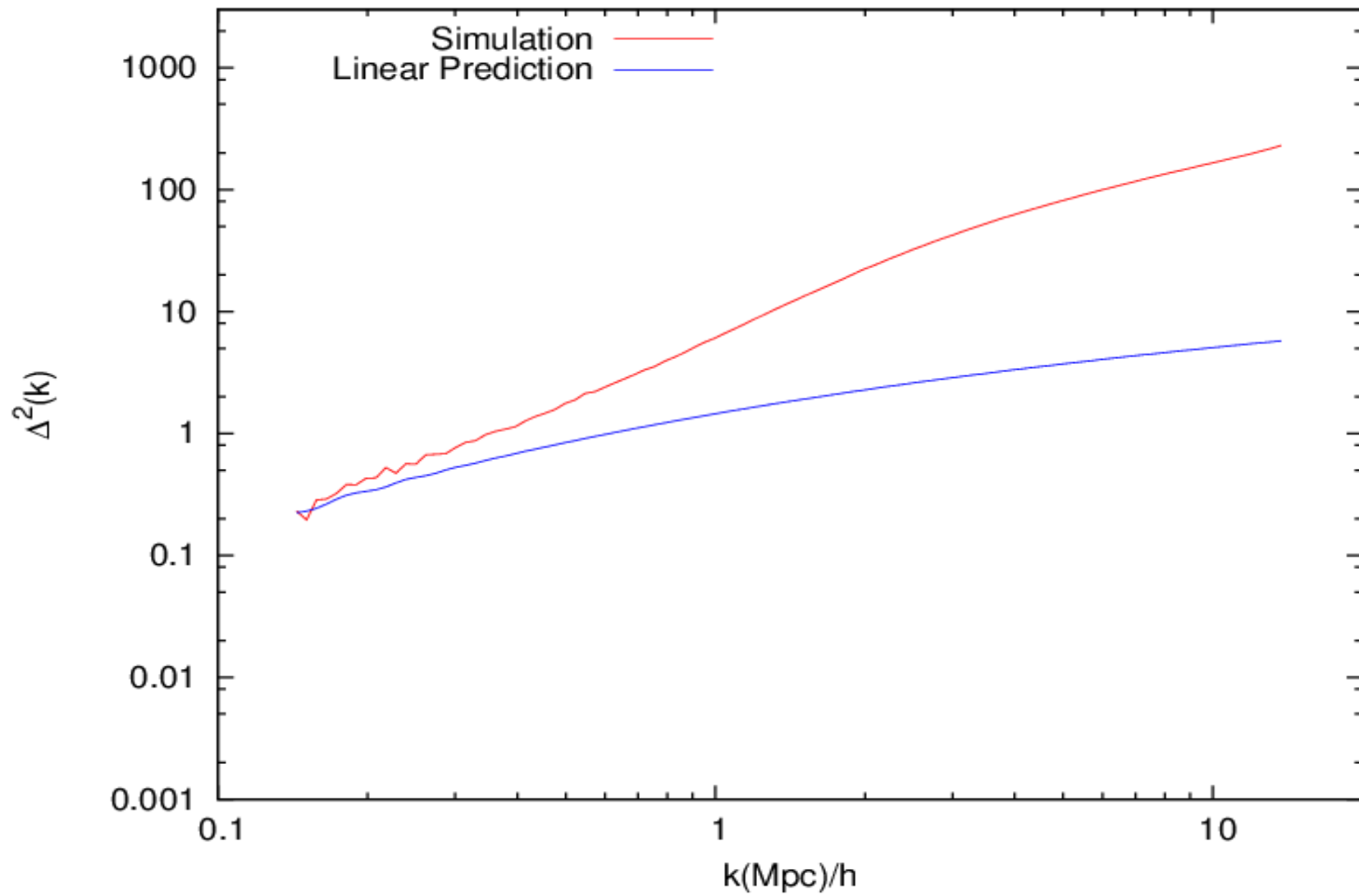
$z=18$



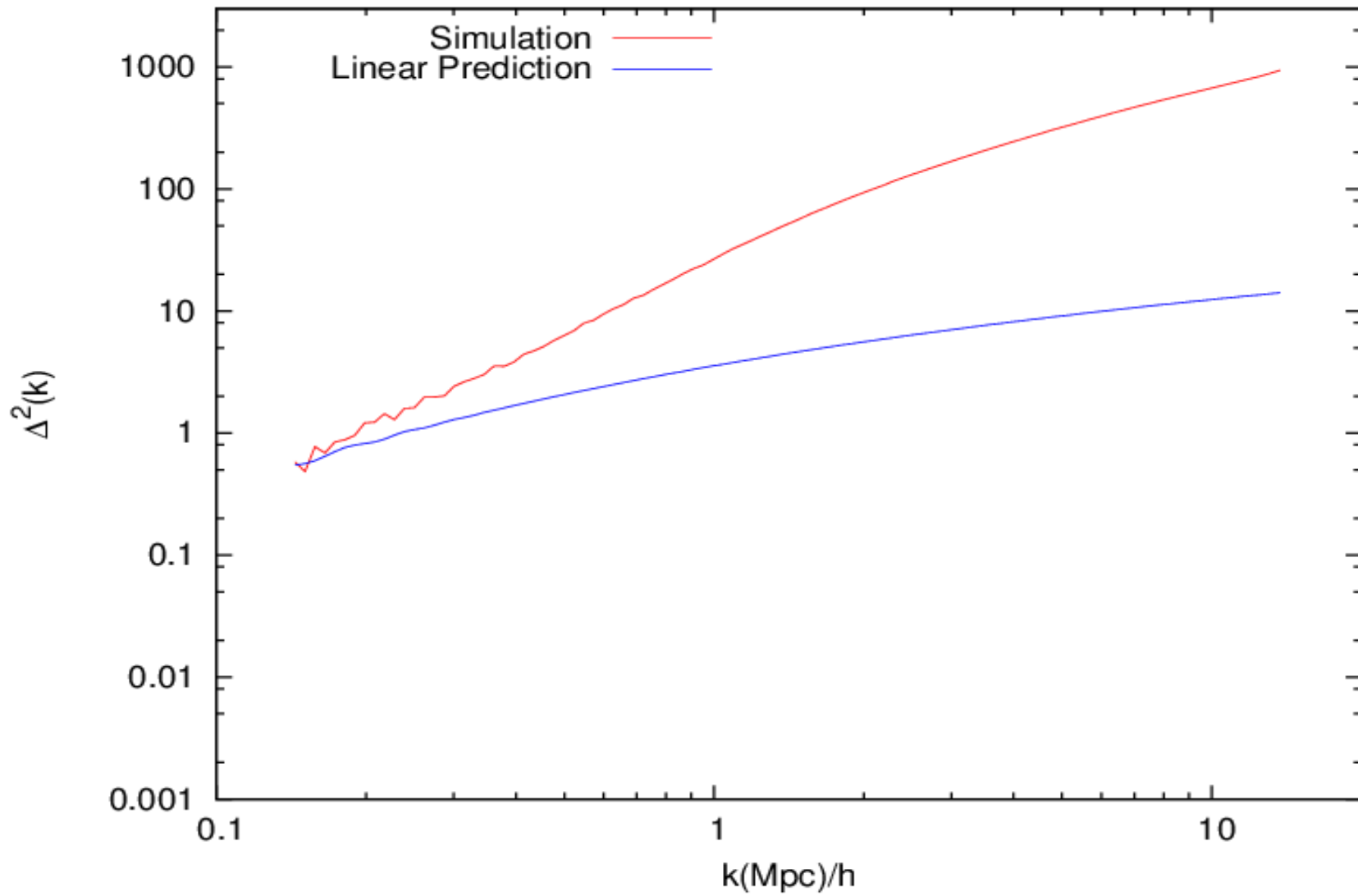
$z=6$



$z=1$



$z=0$



Aim

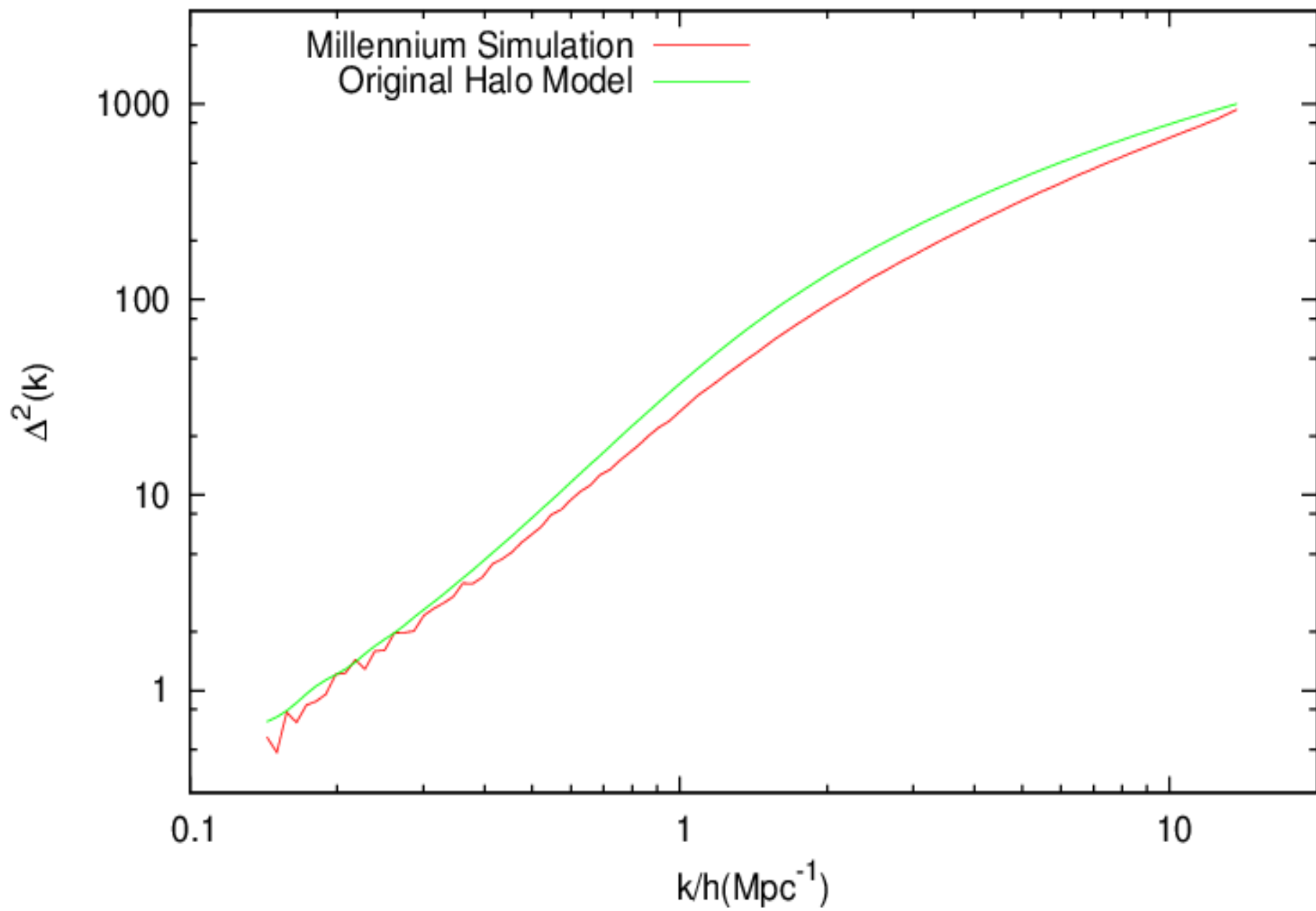
- To have an accurate model of the total matter power spectrum, including the non-linear part
- Important for gravitational lensing
- One approach – simulations and interpolate
- Coyote Universe
- HALOFIT

The halo model

- Randomly distribute haloes
- Assign each a mass (from a mass distribution)
- Assign each a (mass dependent) density profile
- Fourier Transform
- Add linear power to account for large scale patterns

$$\Delta_{\text{halo}}^2(k) = 4\pi \left(\frac{k}{2\pi} \right)^3 \frac{1}{\bar{\rho}^2} \int M^2 W^2(k, M) f(M) dM.$$

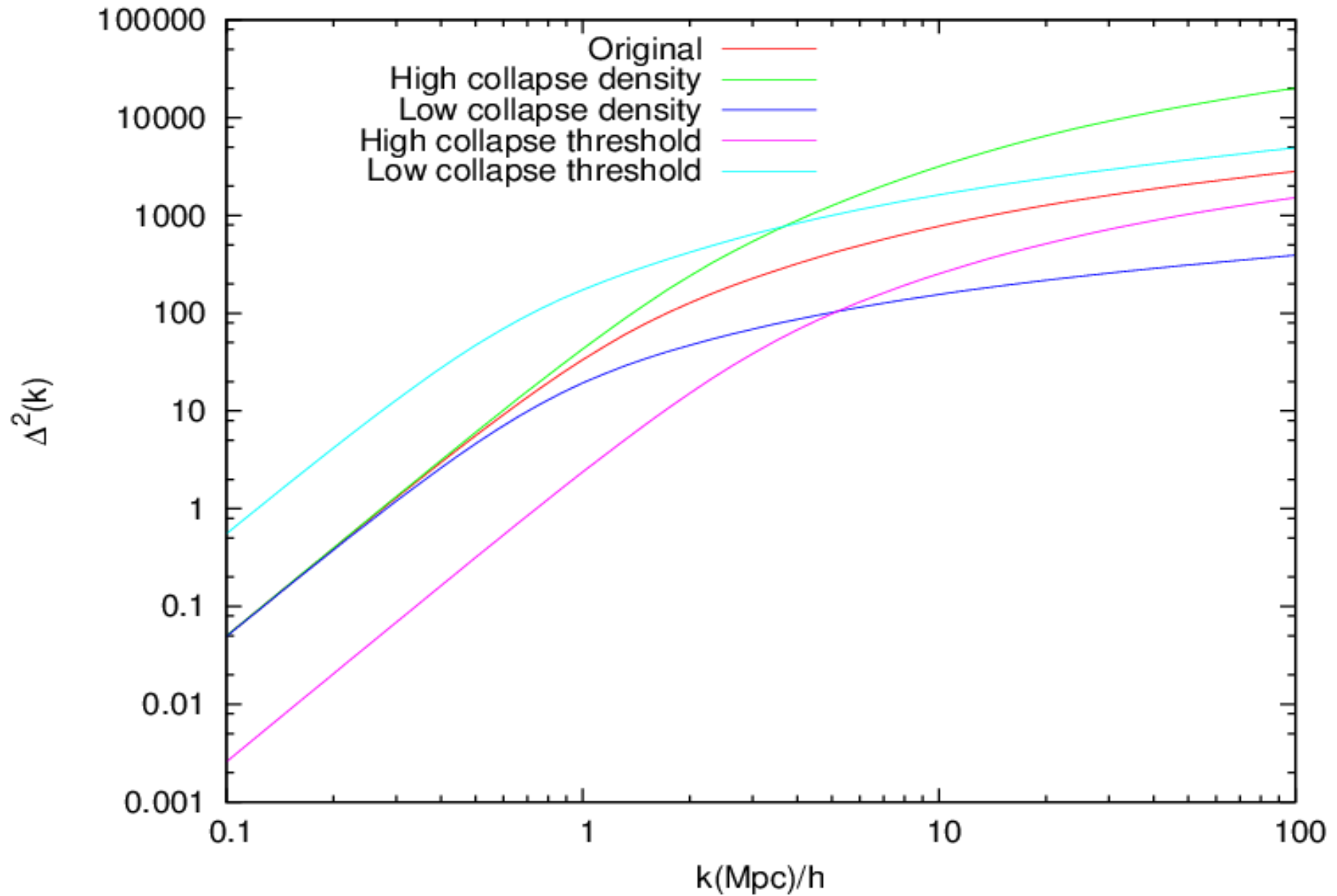
Original Halo Model vs. Millennium Simulation at z=0



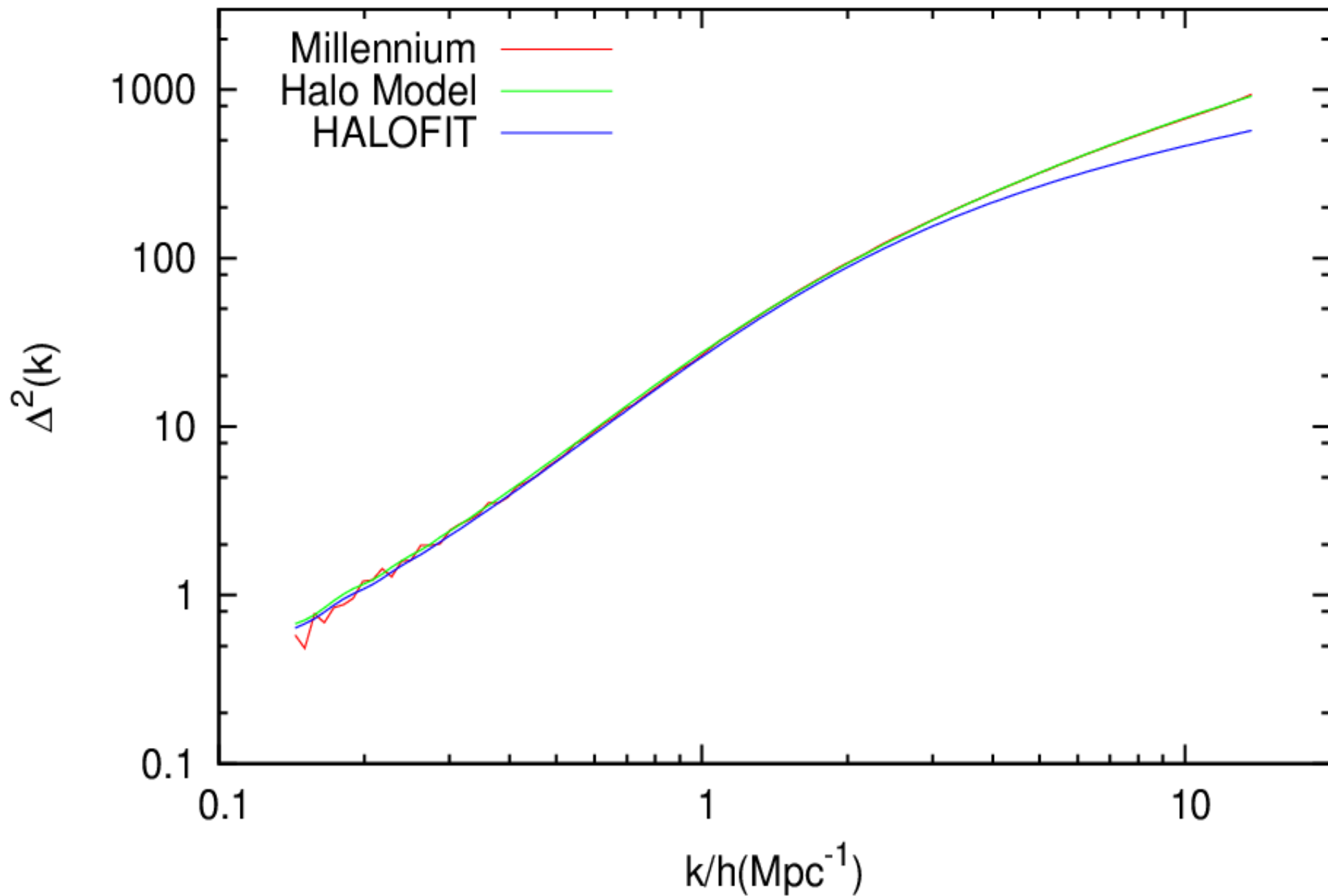
Modifications

- The halo model has some freedom which can be exploited.
 - Mass Function
 - Press-Schechter
 - Sheth-Tormen
 - Linear collapse threshold
 - Halo Profiles
 - NFW
 - Moore
 - Virialised over density

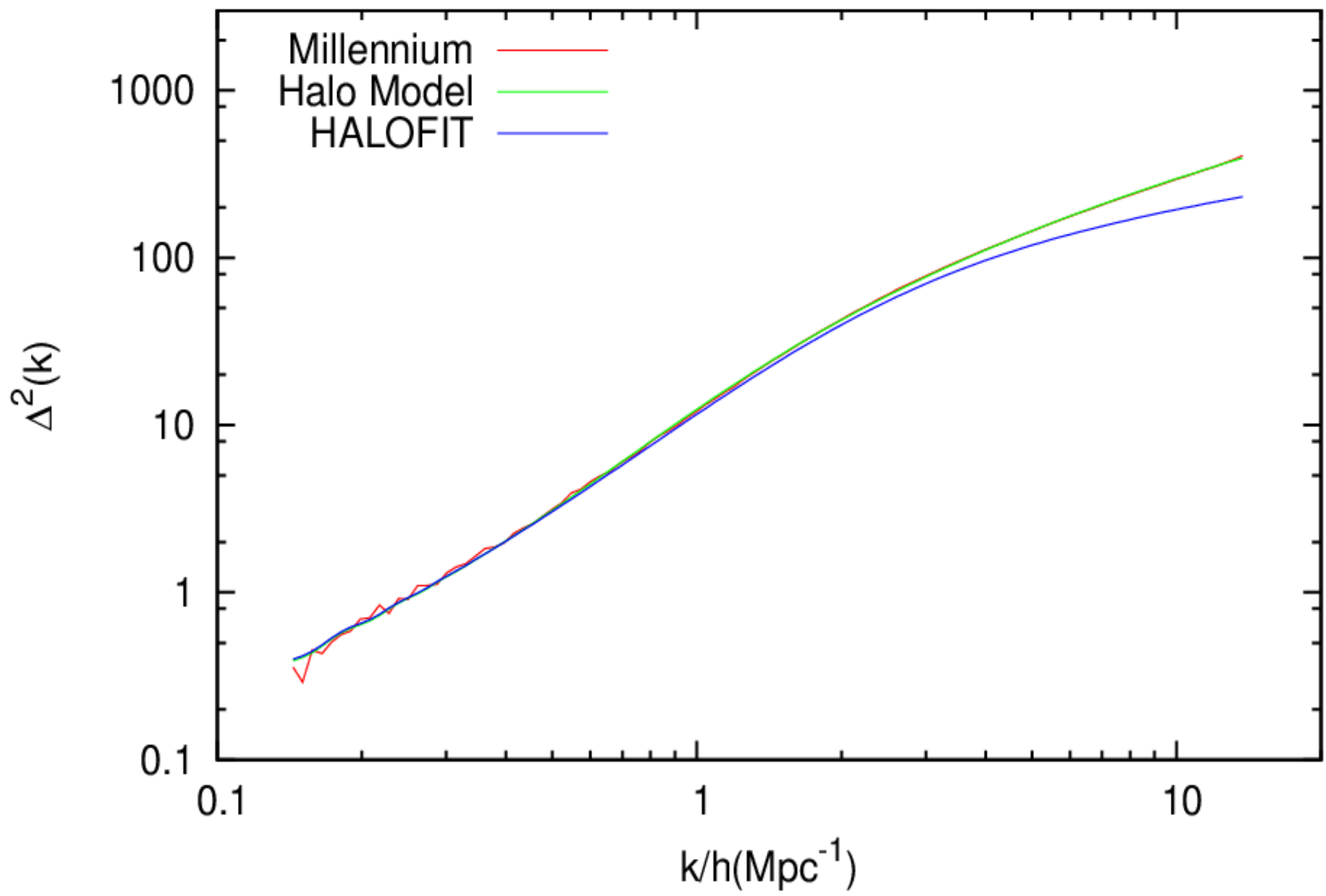
Effect of changes



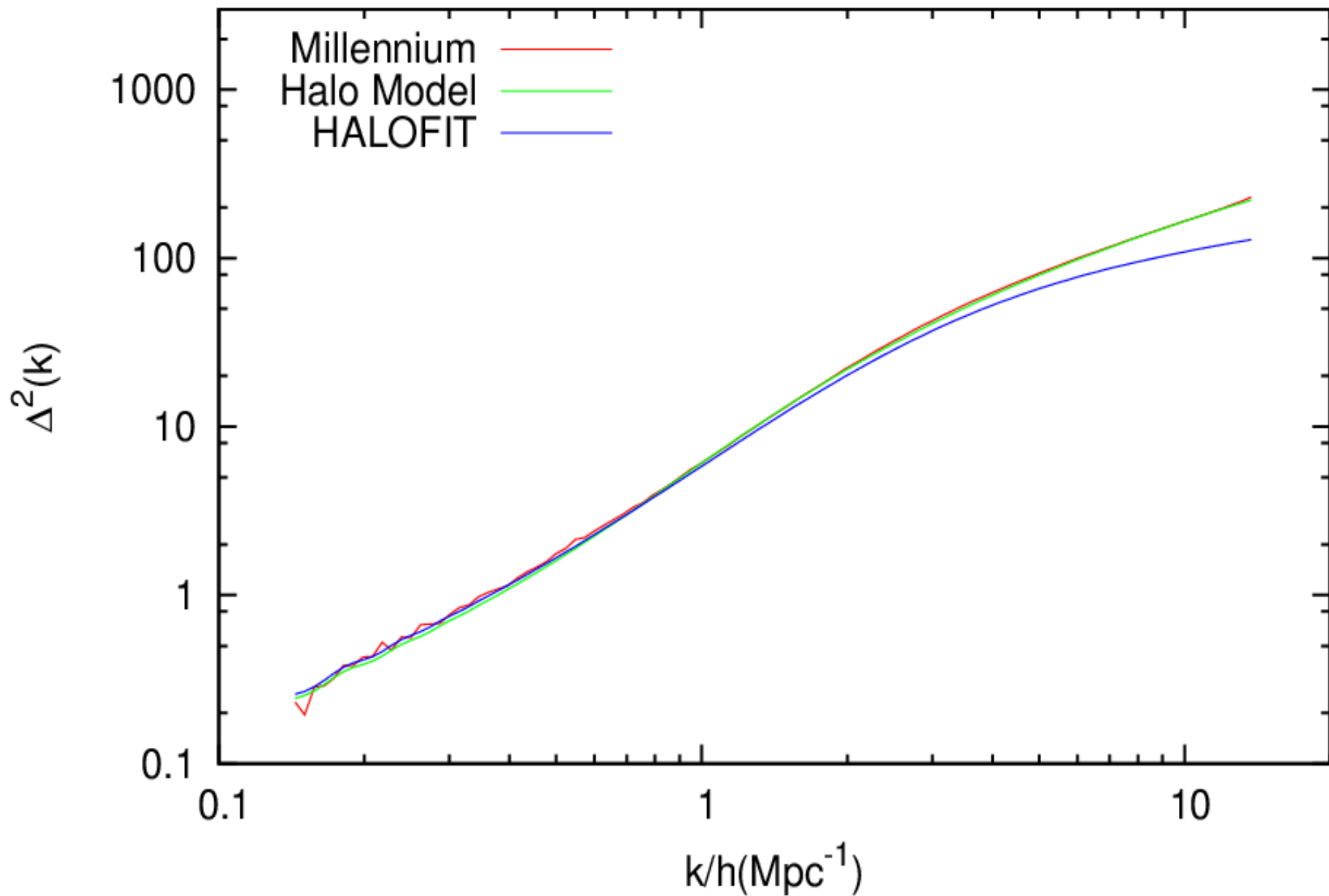
z=0.0



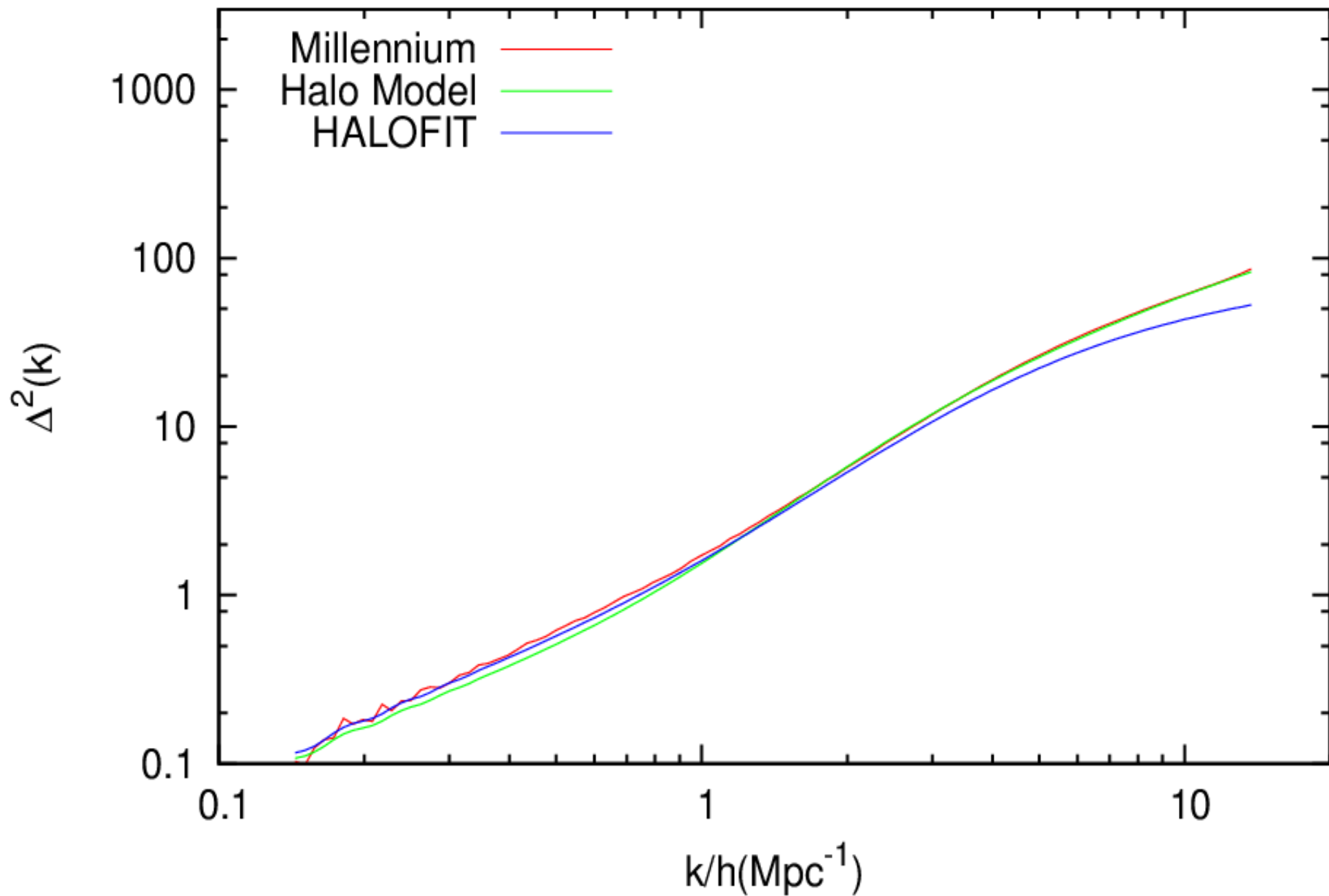
$z=0.5$



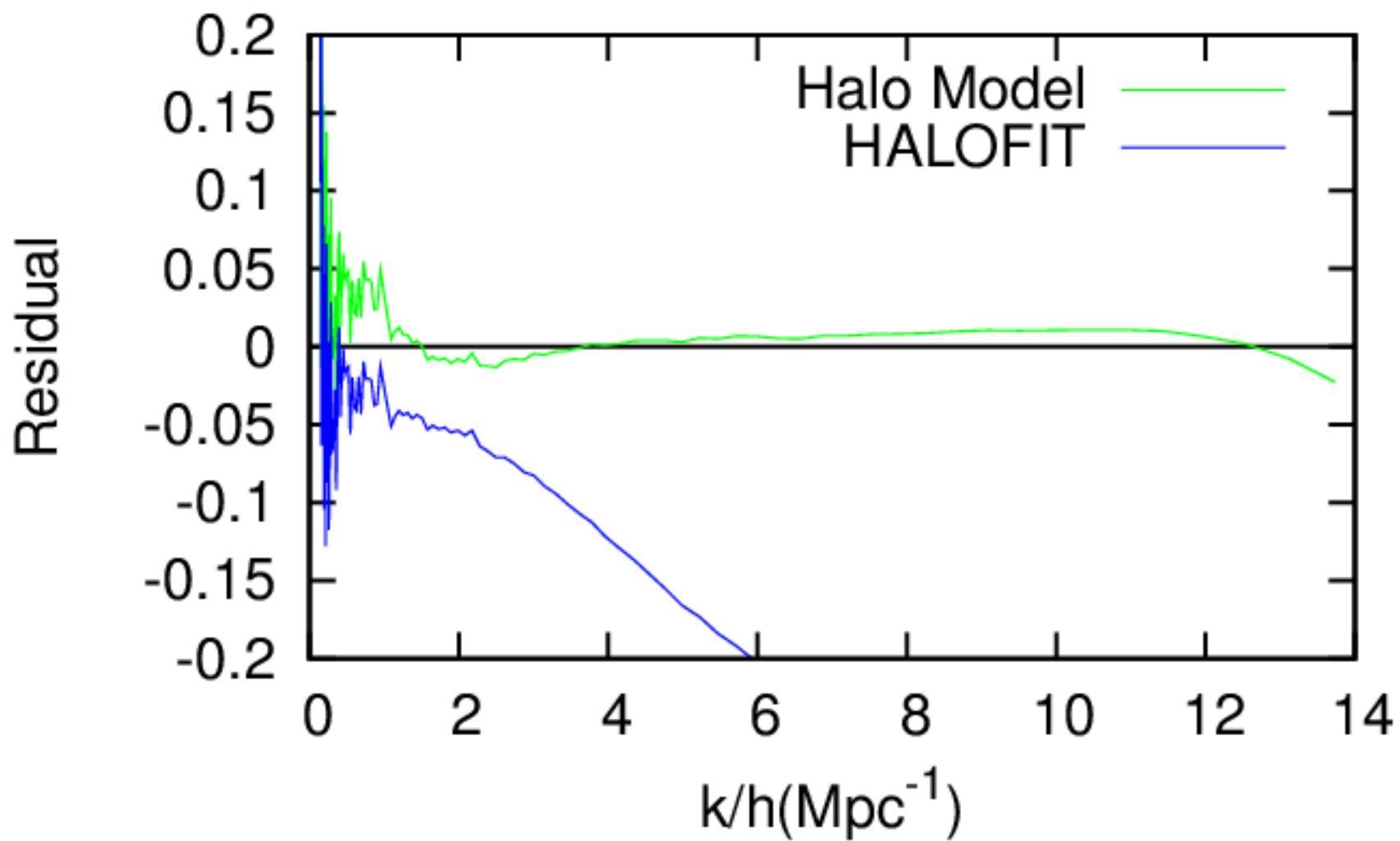
$z=1.0$



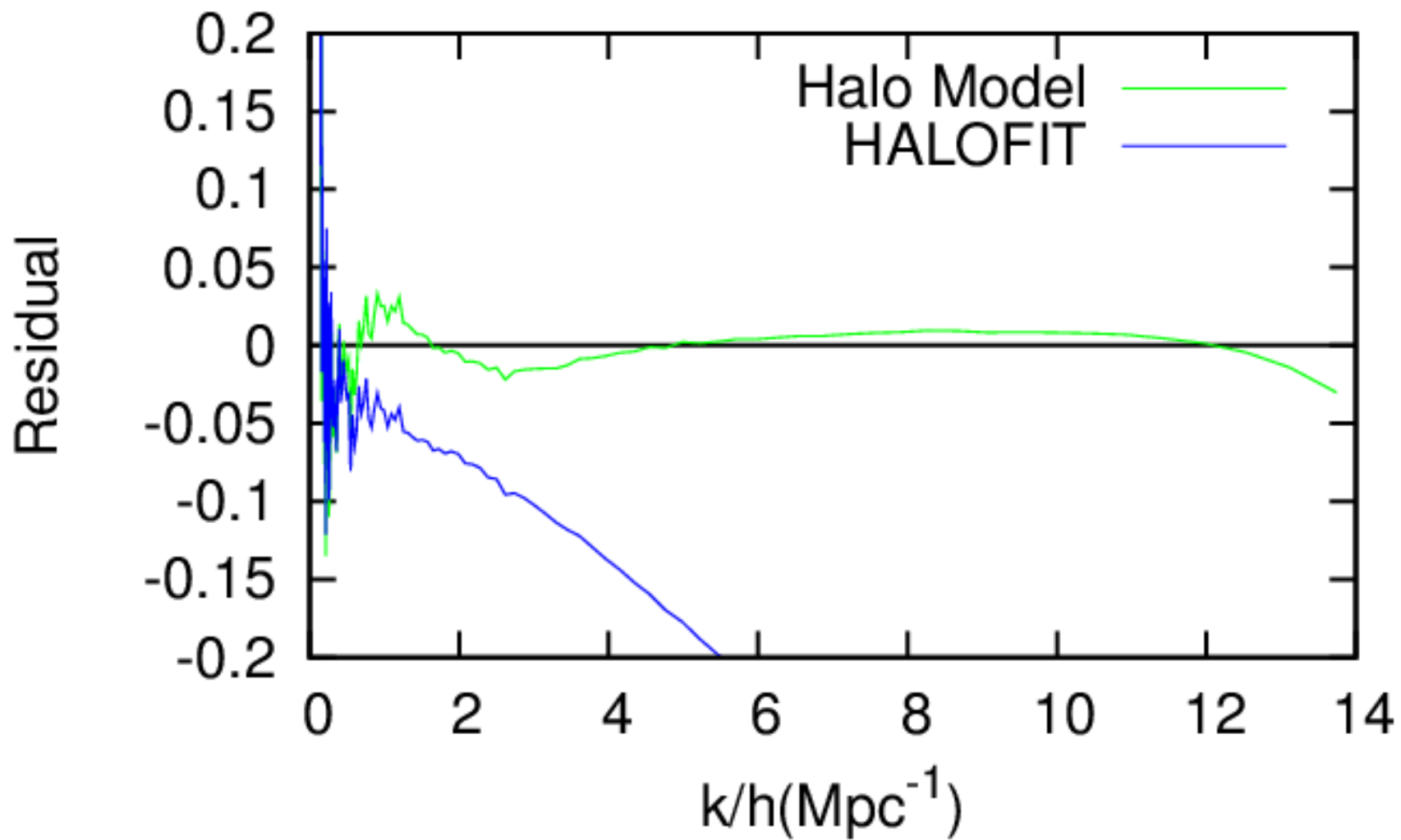
z=2.0



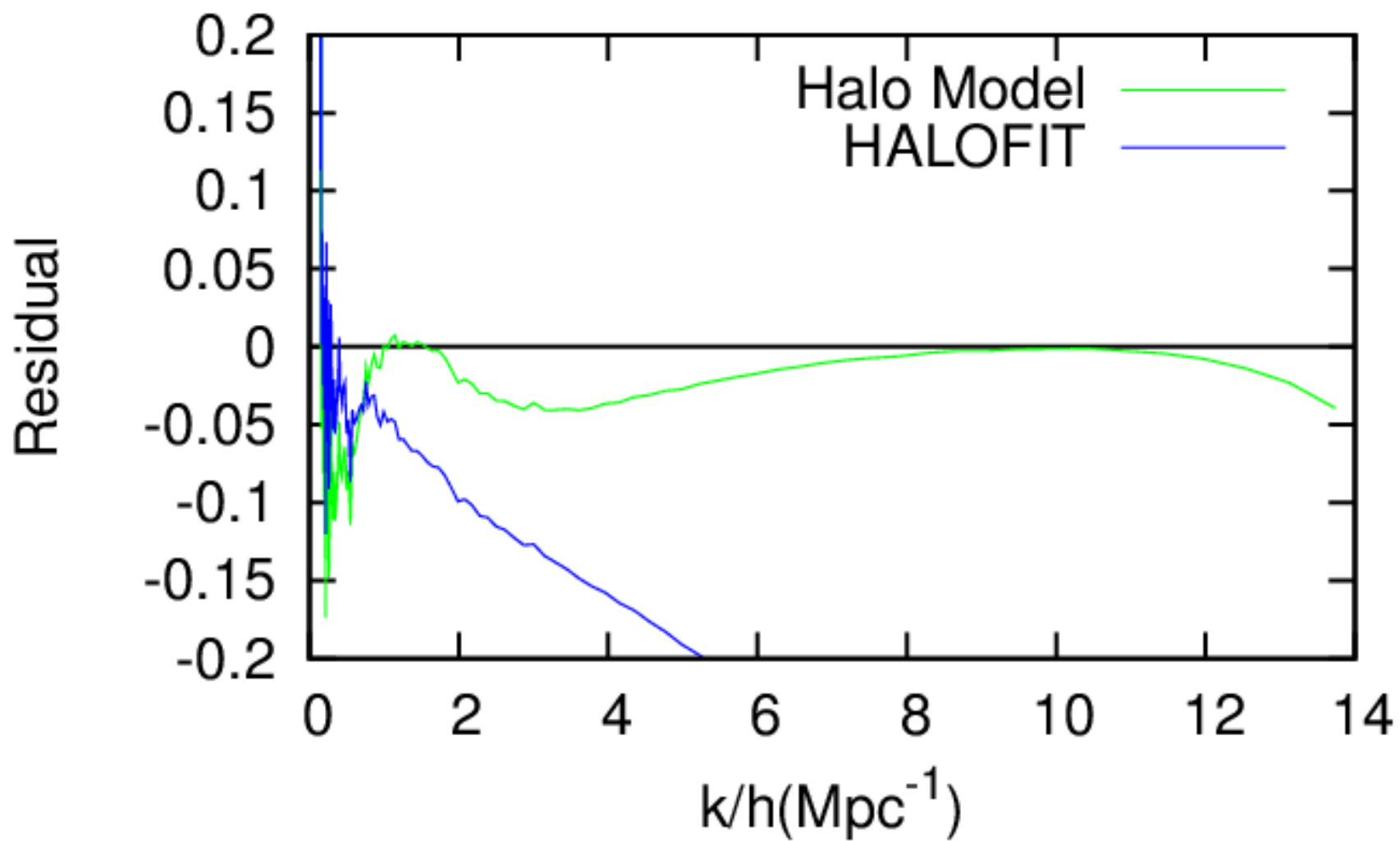
$z=0.0$



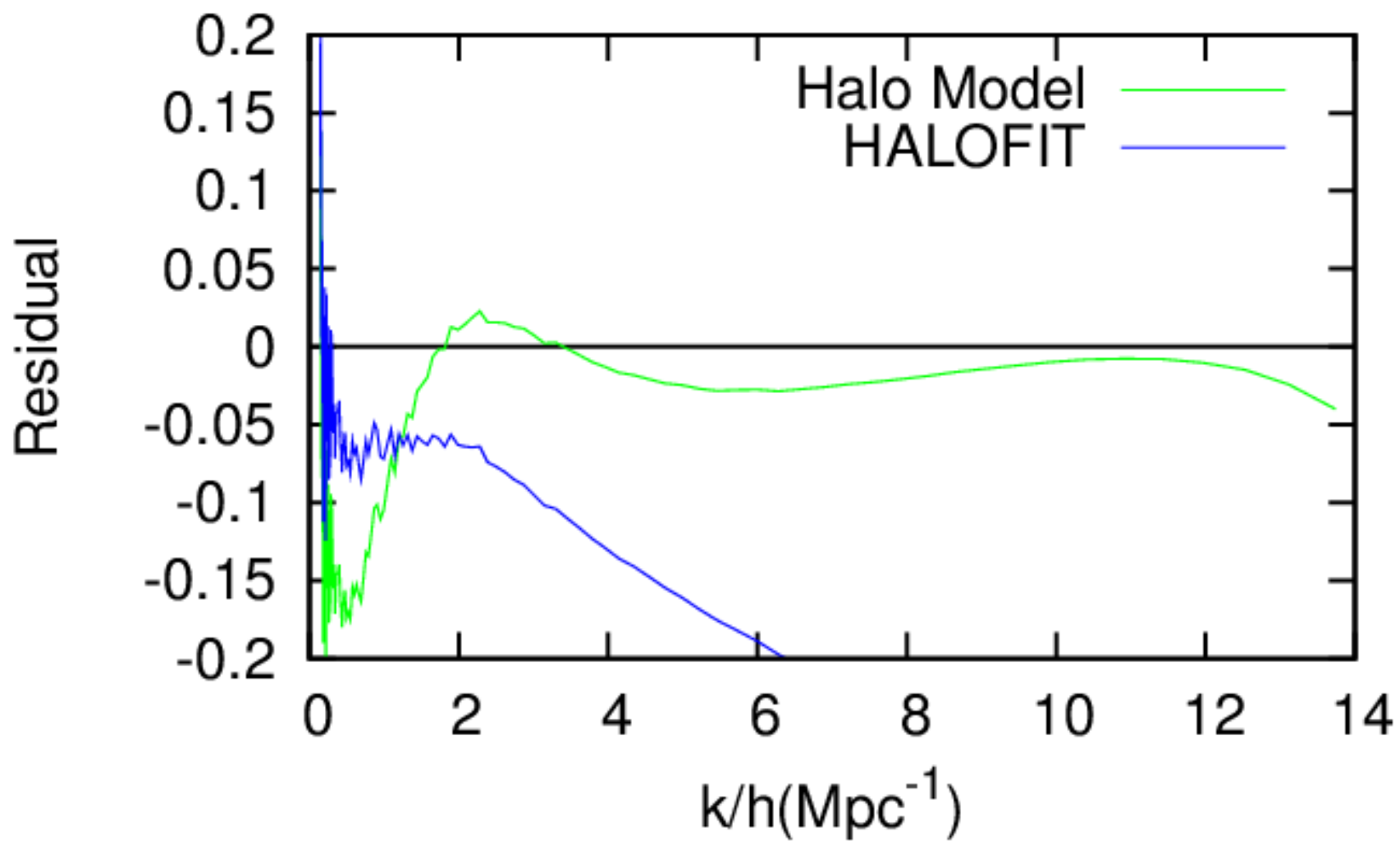
$z=0.5$



$z=1.0$



$z=2.0$



Outlook

- All that remains to do is some fine tuning
- Should be public soon
- Future extensions:
 - modified gravity
 - dark energy
 - redshift-space distortions
 - baryons