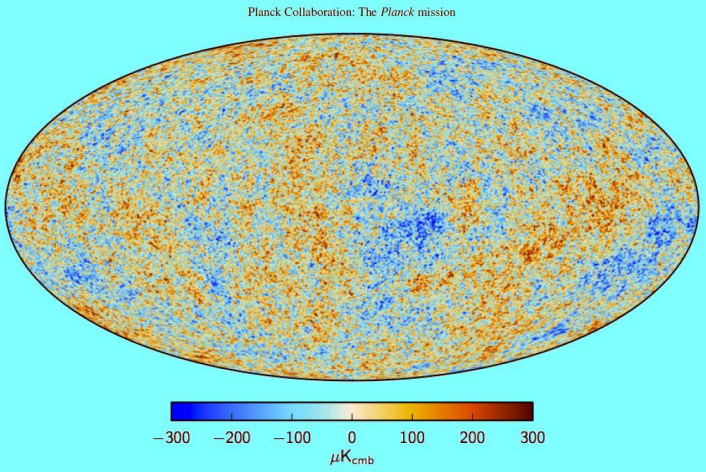
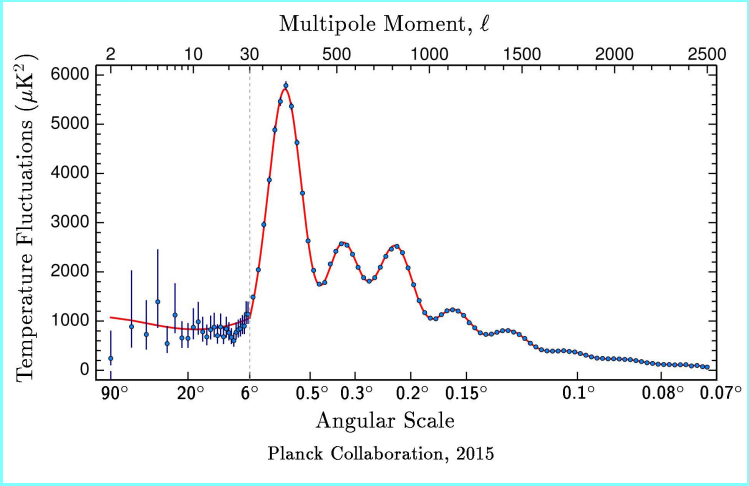
8.962 Lecture 26
May 16, 2018

COSMOLOGY

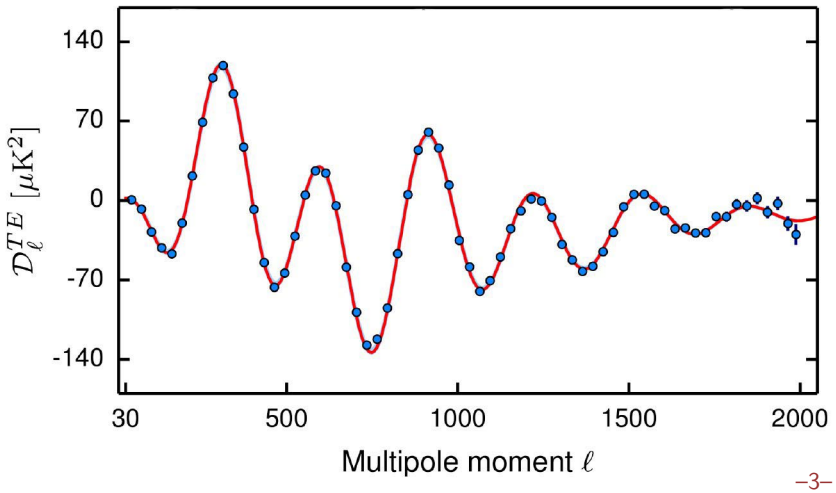
Ripples in the Cosmic Microwave Background



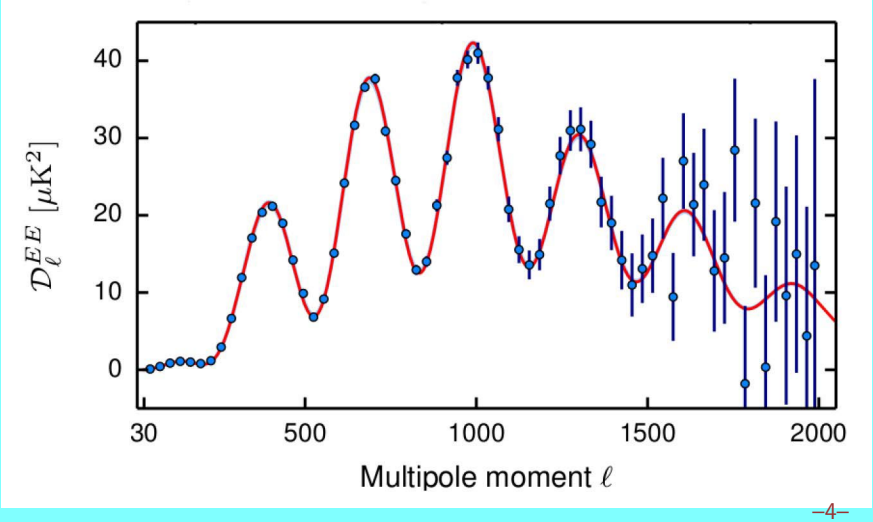
Spectrum of CMB Ripples



Planck 2015 TE Power Spectrum



Planck 2015 EE Power Spectrum



Gaussianity of the CMB

Nongaussianites are measured by $f_{\rm NL}$, where Planck 2015 set the bounds

$$f_{\rm NL}^{\rm local} = 0.8 \pm 5.0\,,$$
$$f_{\rm NL}^{\rm equil} = -4 \pm 43\,,$$
$$f_{\rm NL}^{\rm ortho} = -26 \pm 21 \qquad (68\%\ \text{CL statistical}).$$

Local, equil, and ortho refer to three different "shapes" for the 3-point function (bispectrum). $f_{\rm NL}$ is defined by

$$\Phi = \Phi_g + f_{\rm NL}\Phi_g^2\,,$$

where Φ is the Bardeen potential. Note that the nongaussian term will be comparable to the gaussian term when $f_{\rm NL} \sim 10^5$, so the limits imply that the CMB is VERY gaussian.