

419T Assignment - Week 9

Reading Assignment Abbreviations: L= Liddle; H&H = Hawley & Holcomb; JL = Jones & Lambourne

Topic: Structure in the Universe

Reading:

L: A5; H&H:15, starting at p. 447; JL: Ch. 6.6-7

Handouts: *Hu & White; Strauss*

On the Course Links page:

Slightly more advanced CMB discussion (through discussion of “higher peaks” – skim through other slides as you like)

Boomerang Image

Large Scale Structure (slide numbers refer to those in upper right – NOT lower right, beginning with 8-) 1-20; 50-end (skim through other slides as you like)

A. PROBLEMS Answer the following questions and explain all your steps.

1. For the dipole anisotropy, the fractional increase in temperature, $\Delta T/T$ is equal to $-v/c$, where v is our speed. Justify this relation using expressions for Wien’s Law and the Doppler shift.
2. Calculate $\Delta T/T$ imposed on the true CBR by the following motions and characterize as clearly as possible the direction(s) and periodicity (if any) of maximum amplitude (You’ll have to do some searching for relevant values – be sure to cite your sources):
 - a) the Earth’s orbital velocity
 - b) the sun’s orbit around the galactic center
 - c) the Galaxy’s velocity with respect to M31.

Liddle: A5.2

H&H: 15.1, 2

B. ESSAY – 3-4 pages

Compare what we learn about cosmology from studying galaxies (and their constituent stars) with what we learn from the cosmic background radiation. Are both approaches necessary, i.e. could we know all that we know now by studying only one or the other? Why or why not?