Cosmology Introduction

- Basic assumptions: isotropy, homogeneity, GR
- Evidence for isotropy
  - CMB
  - Review counts in cells, angular correlation function
- homogeneity
  - Galaxy correlation functions, counts in cells
    - Discuss SDSS LRGs
    - Review correlation function and its relation to power spectrum
    - Discuss power spectrum, Gaussian initial conditions, transfer function
  - Quasar correlation function
    - Discuss SDSS quasars (Shen et al. 2007)

- Review Hubble Equation
  - Discuss curvature
  - Solutions for radiation domination/matter domination/curvature domination/vacuum energy domination

- Testing big bang model
  - Tests of a(t) and redshifting
    - Redshift is independent of frequency up to z = 6
    - Supernova duration versus redshift (Goldhaber et al. 2001)
• Spectrum is black body (test of tired light or $d_a/d_L$)
Fig. 3. Measurements of $T_{\text{eff}}$ at different redshifts. Upper limits from previous works (Songaila et al. 1994; Lu et al. 1996; Ge et al. 1997; Roth & Bauer 1999; Srianand et al. 2000) are marked by triangles. The dot with error bars shows the estimation of $T_{\text{eff}}$ at $z_{\text{abs}} = 3.025$ toward Q0347–3819 (this letter). The straight line shows the prediction from the hot Big Bang cosmological model, $T_{\text{CMBR}}(z) = T_{\text{CMBR}}(0) (1 + z)$. 
Hubble Diagram

- Explain magnitudes, astronomical bands
- Review atmosphere
- Data from Krisciunas et al (2004)

Evidence for galaxy evolution

- Surface brightness/redshift relation
  - explain angular and luminosity distance and how they scale with redshift

Big Bang Nucleosynthesis

- Discuss deuterium abundance
- Helium abundance
- Sensitivity to baryon density and Temperature-time relationship
Modern tests
• CMB (if time, review CMB--- if not, cover in future lecture)
• Baryon Oscillations
• Lensing

INTRODUCTION TO CONTEMPORARY COSMOLOGY
RECOMMENDED BOOKS

0. **Large Scale Structure of the Universe**, P.J.E. Peebles (Princeton U. Press, 1980).
0. **The Early Universe**, E.W. Kolb and M.S. Turner (Addison-Wesley, 1994).
0. **Cosmology**, P. Coles and F. Lucchin (John Wiley & Sons, 1997).
0. **Cosmology**, S. Weinberg (Oxford, 2008).