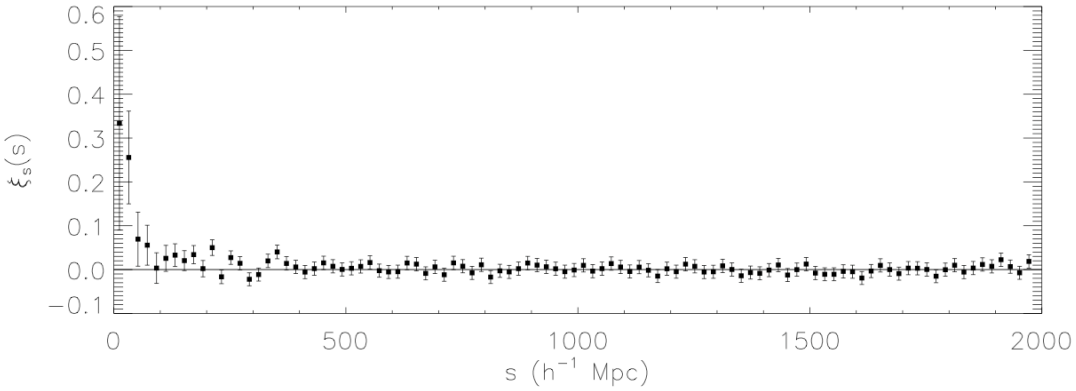
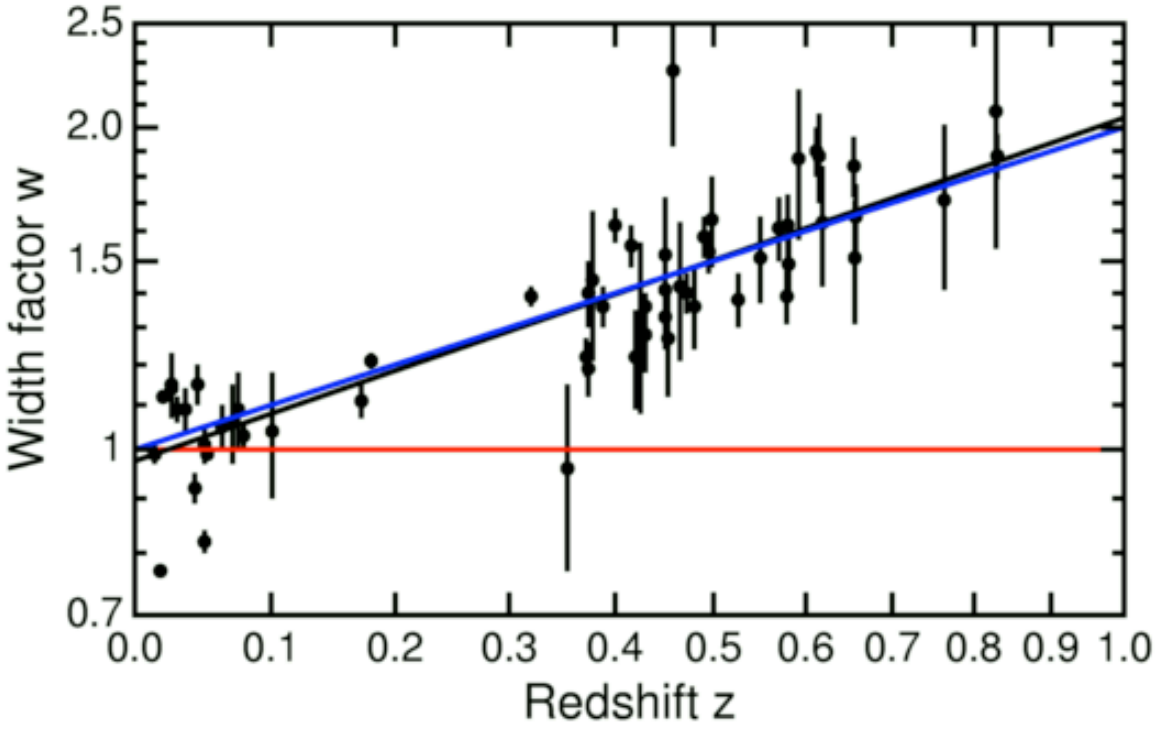
Cosmology Introduction

- 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 specrum
        - Discuss power spectrum, Gaussian initial conditions, trsnasfer function
    - Quasar correlation function
        - Discuss SDSS quasars (Shen et al. 2007)

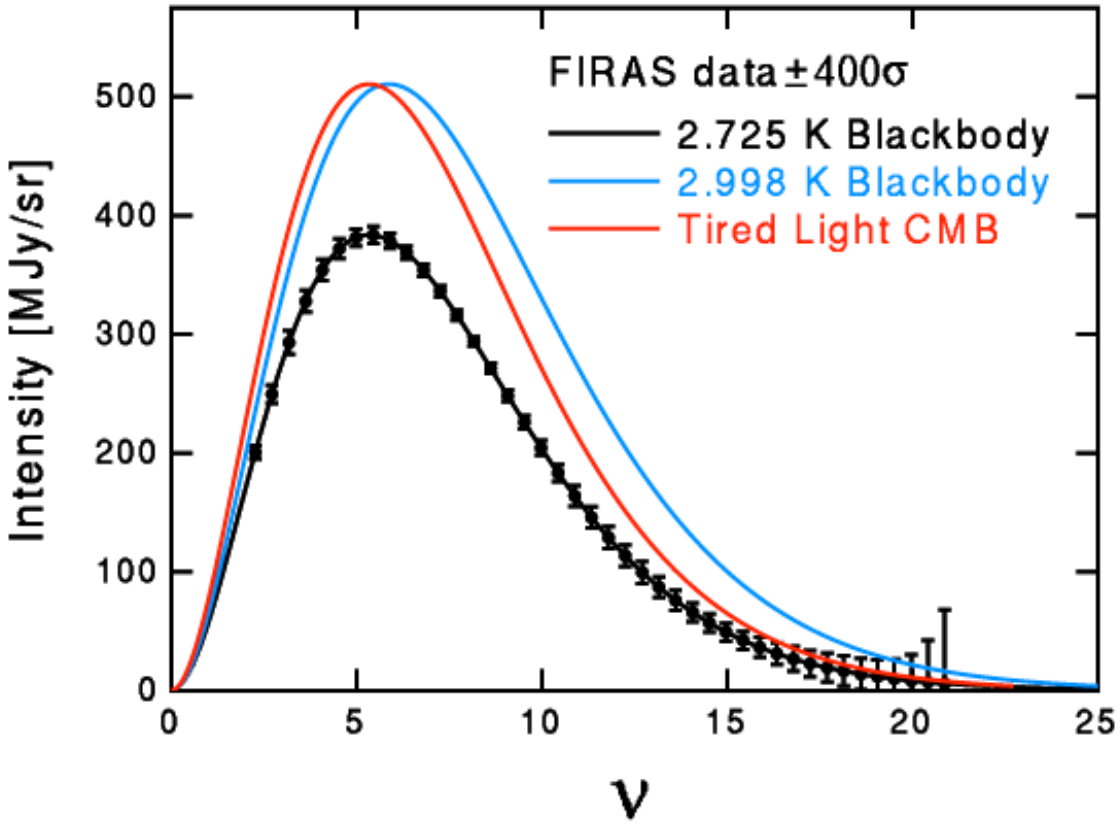


- Review Hubble Equation
    - Discuss curvature
    - Solutions for radiation domination/matter domination/curvature domination/vacuum energy domination

- 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



Temperature versus redshift

Explain atomic thermometers

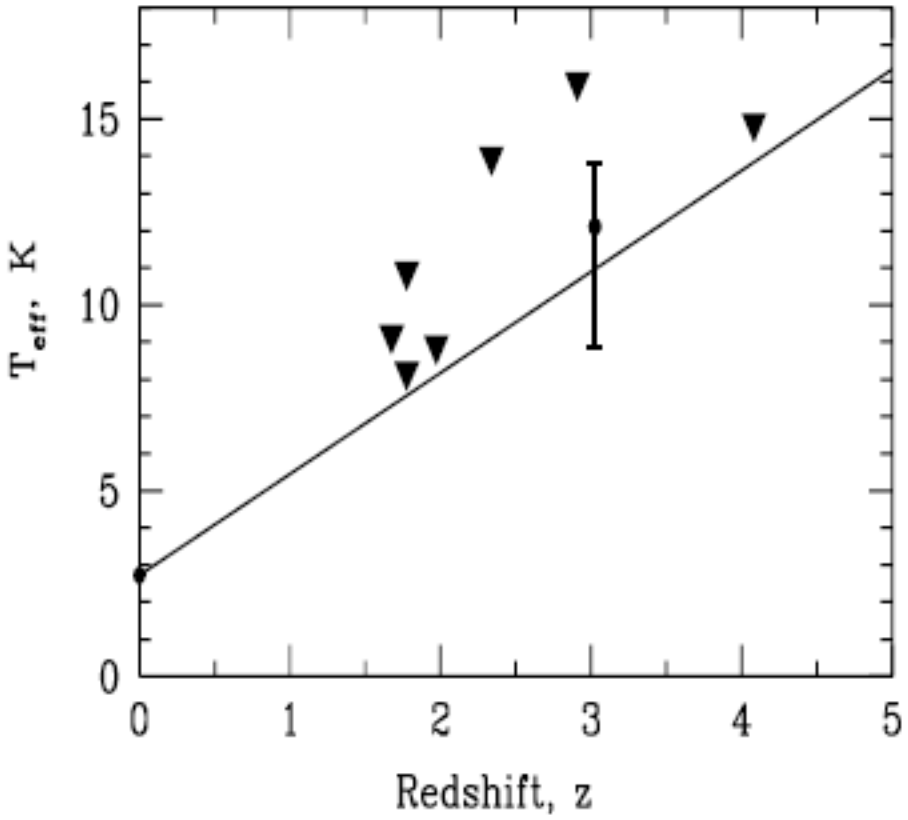


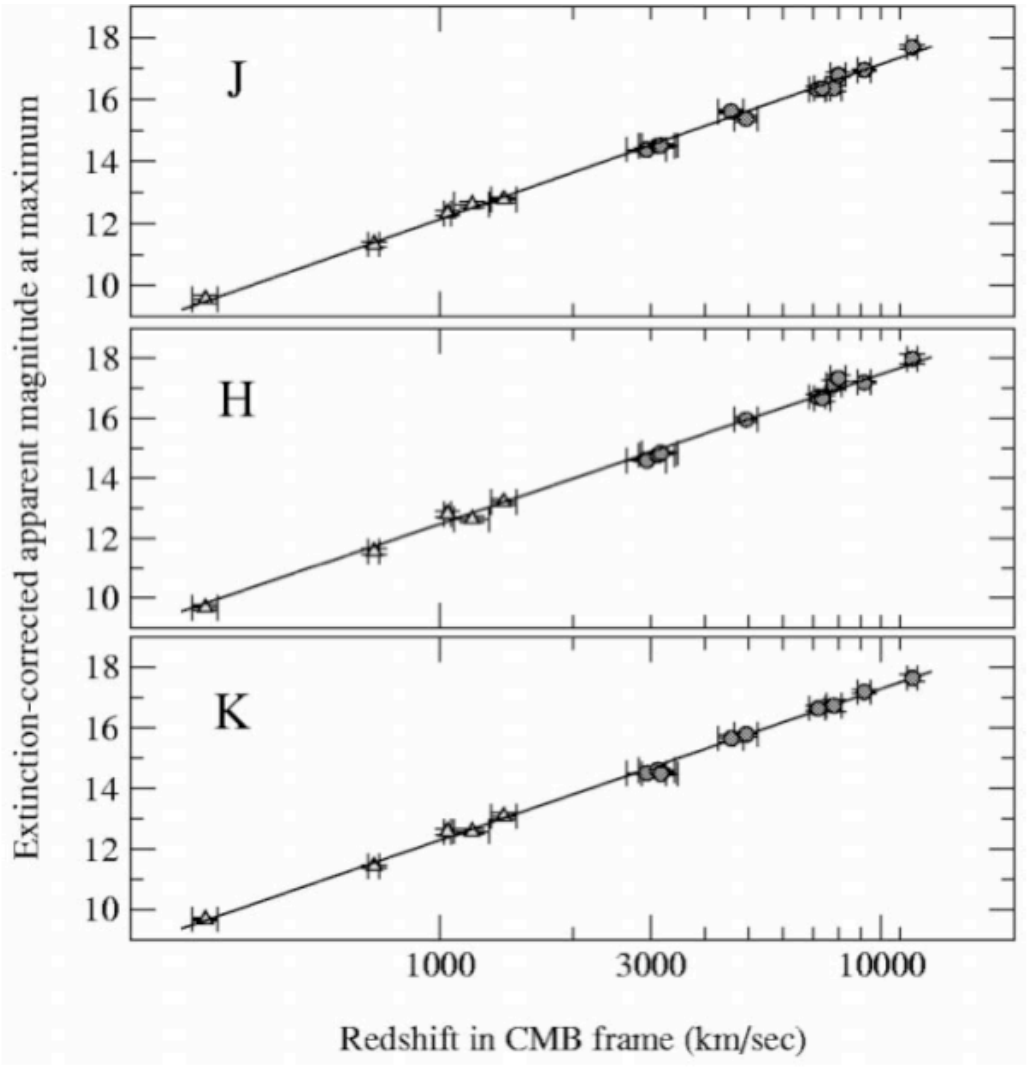
Fig. 3. Measurements of $T_{\rm eff}$ at different redshifts. Upper limits from previous works (Songaila et al. 1994; Lu et al. 1996; Ge et al. 1997; Roth & Bauer 1999; Srianand et al. 2000) are marked by triangles. The dot with error bars shows the estimation of $T_{\rm eff}$ at $z_{\rm abs} = 3.025$ toward Q0347–3819 (this letter). The straight line shows the prediction from the hot Big Bang cosmological model, $T_{\rm CMBR}(z) = T_{\rm CMBR}(0)\,(1+z)$.

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 Temperaure 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. **Gravitation and Cosmology**, S. Weinberg (John Wiley & Sons, 1972).
0. **Principles of Physical Cosmology**, P.J.E. Peebles (Princeton U. Press, 1993).
0. **Large Scale Structure of the Universe**, P.J.E. Peebles (Princeton U. Press, 1980).
0. **Relativistic Astrophysics**, I.D. Novikov and Ya. B. Zel'dovich (U. of Chicago Press, 1983).
0. **Particle Physics and Inflationary Cosmology**, A.D.Linde (Harwood Academic, 1990).
0. **The Early Universe**, E.W. Kolb and M.S. Turner (Addison-Wesley, 1994).
0. **Cosmological Physics**, J. Peacock (Cambridge U. Press, 1998).
0. **Cosmological Inflation and Large Scale Structure**, A.R. Liddle and D.H. Lyth, (Cambridge U. Press, 2000).
0. **Cosmology**, P. Coles and F. Lucchin (John Wiley & Sons, 1997).
0. **Modern Cosmology**, S. Dodelson (Academic Press, 2003).
0. **Physical Foundations of Cosmology**, V. Mukhanov (Cambridge, 2005).
0. **Cosmology**, S. Weinberg (Oxford, 2008).