Notes for Watson et al. "A NEW COSMOLOGICAL DISTANCE MEASURE USING ACTIVE GALACTIC NUCLEI"

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1. ARTICLE

Article goes through why this new distance measurement technique Broad-line Region Reverberation Mapping is useful for determining H_0 and looking at the evolution of the dark energy equation of state. It also describes how the tools used at the time could only determine distances to objects up to a redshift of around 1.7, while using AGN it is possible to determine distances for objects out to a redshift of 4-6. This is the BLR method that obtains the time lag $\tau = r/c$ from measuring the time lag between changes in the continuum luminosity of the AGN and the luminosity of a bright emission line (typically Hβ or C iv) , since the changes in the BLR are powered by the continuum emission it will respond to changes in the continuum. Because of this the time lag should be proportional to the square root of the luminosity of the central source which means $\tau \propto \sqrt{L}$. The luminosity is $L = 4\pi F d_L^2$ so $\frac{\tau}{\sqrt{F}}$ will be a measure of the luminosity distance to the source. The method seems to be in agreement with the Wilkinson Microwave Anisotropy Probe ΛCDM cosmology derived distances. the scatter in the AGN Hubble diagram comes mainly from 3 sources observational, Extinction associated with the AGN and its host galaxy (includes extinction to galaxy and internal extinction) and incorrect lags and all can be reduced.