

1.3.2 Variability

Quasars are variable in every waveband in which they have been studied, not only in the continuum but in the broad emission lines as well. Optical continuum variability of quasars was established even before the emission-line redshifts were understood (e.g. Matthews and Sandage 1963), and variability was one of the first properties of quasars to be explored in detail (e.g., Smith and Hoeffleit 1963). A few quasars had been

Source: Peterson, B.M. (1977) *An Introduction to Active Galactiv Nuclei*, Cambridge University Press.

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identified as unusual 'variable stars' (e.g., GQ Comae = 1202+281 and BL Lacertae = 2200+420) before their spectral properties were known. Many quasars were found to be variable at the 0.3–0.5 mag level over time scales of a few months. A few sources were found to vary significantly on time scales as short as a few days. One can thus conclude on the basis of coherence arguments that much of the radiation must come from a region of order light days (1 light day = 2.54×10^{15} cm) in size. This was immediately perceived as a major problem, since a nucleus comparable in size to the Solar System is emitting hundreds of times as much energy as an entire galaxy.

Source: Peterson, B.M. (1977) *An Introduction to Active Galactiv Nuclei*, Cambridge University Press.