

Reverberation Mapping and spatial structure of the quasars (Liudmyla Berdina)

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Quasars are known to be variable objects, which change their brightness in a wide range of time scales – from several hours to several years. In gravitational lens systems, we have an opportunity to observe the quasars intrinsic brightness variations repeated in all macroimages and shifted in time. One of the importance applications in astrophysics of measuring these time shifts is the study of matter distribution at different spatial scales in the Universe. We propose new method for processed the astronomical observations data. This method allows to analyse a light curves of quasars and obtain the new more accurate estimates of the time delays. Our method was tested on an example measuring the time delays in gravitationally lensed quasars Q2237+0305 and obtained results was consistent with the most recent theoretic predictions. Also, our method allows measuring the time delays between the brightness fluctuations in different parts of the spectrum. This approach, called reverberation mapping method, allows to obtain direct estimates of distances between the quasar regions responsible for radiation in different spectral bands and investigate their spatial structure with a very high resolution. The method for analyze of observational data is important because despite multilateral studies of quasars and active galactic nuclei, their spatial structure, spectral features, and the mechanism of variability are still not entirely clear. High expectations are associated with observational projects involving simultaneous observations of changes in the brightness of quasars and AGNs in several spectral ranges.

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