

Optical Variability of Faint Quasars

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Abstract : The variability properties of a quasar sample, spectroscopically complete to magnitude $J = 22.0$, are investigated on a time baseline of 2 years using three different photometric bands (U, J and F). The original sample was obtained using a combination of different selection criteria: colors, slitless spectroscopy and variability, based on a time baseline of 1 yr. The main goals of this work are two-fold: first, to derive the percentage of variable quasars on a relatively short time baseline; secondly, to search for new quasar candidates missed by the other selection criteria; and, thus, to estimate the completeness of the spectroscopic sample. In order to achieve these goals, we have extracted all the candidate variable objects from a sample of about 1800 stellar or quasi-stellar objects with limiting magnitude $J = 22.50$ over an area of about 0.50 deg^2 . We find that $> 65\%$ of all the objects selected as possible variables are either confirmed quasars or quasar candidates on the basis of their colors. This percentage increases even further if we exclude from our lists of variable candidates a number of objects equal to that expected on the basis of 'contamination' induced by our photometric errors. The percentage of variable quasars in the spectroscopic sample is also high, reaching about 50% . On the basis of these results, we can estimate that the incompleteness of the original spectroscopic sample is $< 12\%$. We conclude that variability analysis of data with small photometric errors can be successfully used as an efficient and independent (or at least auxiliary) selection method in quasar surveys, even when the time baseline is relatively short. Finally, when corrected for the different intrinsic time lags corresponding to a fixed observed time baseline, our data do not show a statistically significant correlation between variability and either absolute luminosity or redshift.

Keywords : nuclear activity, galaxies, active quasars, variability

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