Search for Microvariability in Seyfert Galaxies

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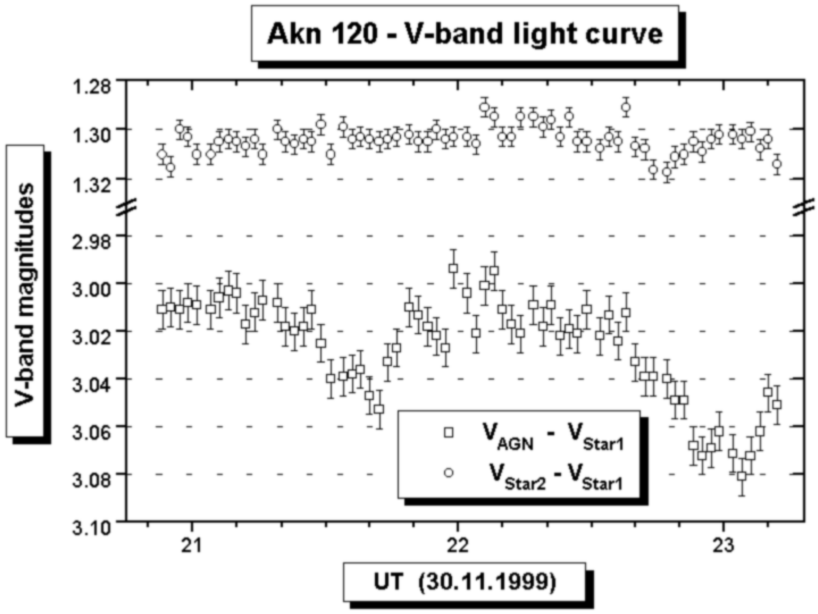
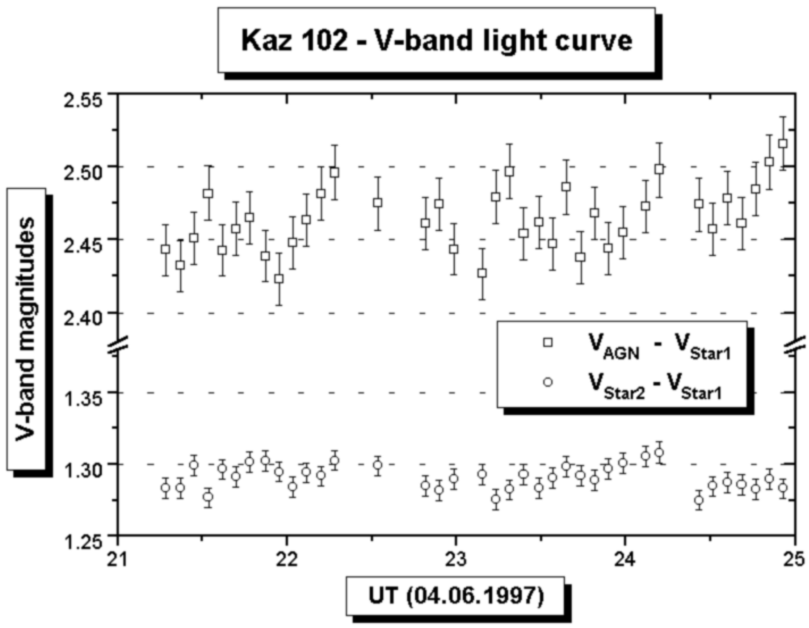
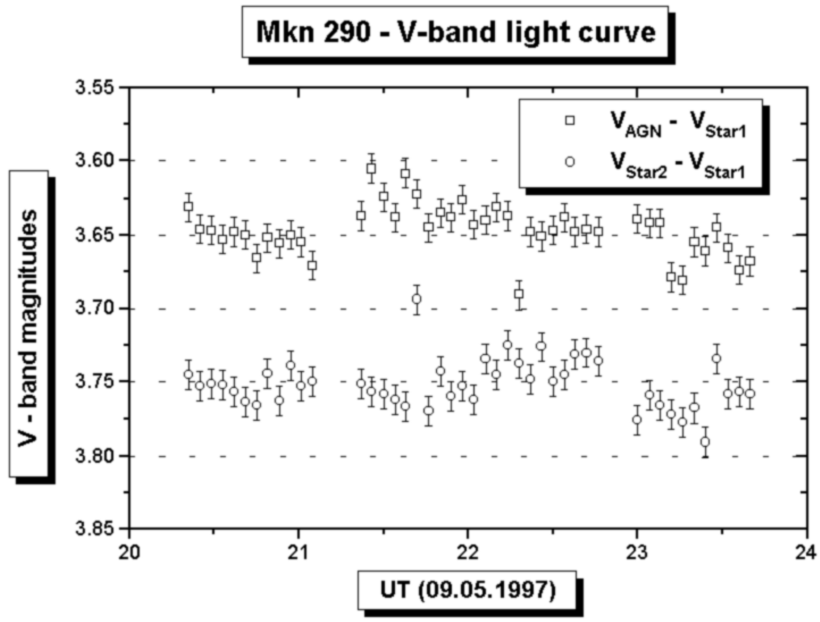
The short-term optical variability is a well documented feature of blazar-type objects (Carini et al., 1991, Miller et al. 1992) and it is reported sometimes to exist in Seyfert galaxies (Dultzin-Hacyan et al. 1992, Jang & Miller 1997, Rabbette et al. 1998). However, significant variations over a short time scale have not been clearly detected so far for any radioquiet object. The characteristics (amplitudes, timescales) of the short-term variations in Seyferts might be a very important constraint for the models of their central engines, providing priceless information about the dimensions and the physical properties of the medium that emits the variable part of the continuum. Feeling that there is still lack of short-term variability data for Seyfert galaxies, we started a V-band optical monitoring of several of these objects. In this paper we present preliminary results of a microvariability CCD-monitoring of 4 bright Seyfert 1 type galaxies (Akn 120, Kaz 102, Mkn 290 and Mkn 335), performed in V-band. All the observations were carried out with the 0.6-m telescope of the Belogradchik Observatory, equipped with SBIG ST-8 CCD and a BVRI Johnson-Cousins set of filters (Bachev et al. 1999). Each observation run was lasting between 1.5 and 4 hours giving the total monitoring time of about 12 hours. The data were obtained during clear photometric nights with seeing of about 2 arcsec. The exposure time was typically in the range 2 - 4 min. Standard aperture photometry was performed in a 12 arcsec diaphragm to derive the magnitudes of the objects. At least two stars in the same frame were used for the differential photometry - the main comparison star and at least one check star. We evaluated the accuracy of our photometry to be in the range 0m.01 – 0m.02 for the monitored Seyferts. The light curves for all the objects are presented in Fig. 1. In general, we failed to detect any significant short-term variations (taking into account the photometric errors) for all monitored objects, except for Akn 120, where some variations of about 0m.05 were detected in V-band. Our results confirm the current understanding that strong brightness variations are not typical for the Seyfert galaxies, some of them might manifest small ($<$ 0m.1) variations within 0.5 – 1 hour.


Akn 120 - V-band light curve
V-band magnitudes
1.28
1.30
1.32
2.98
3.00
3.02
3.04
3.06
3.08
3.10
21
22
23
UT (30.11.1999)
V_AGN - V_Star1
V_Star2 - V_Star1


Kaz 102 - V-band light curve
V-band magnitudes
2.55
2.50
2.45
2.40
1.35
1.30
1.25
21
22
23
24
25
UT (04.06.1997)
V_AGN - V_Star1
V_Star2 - V_Star1



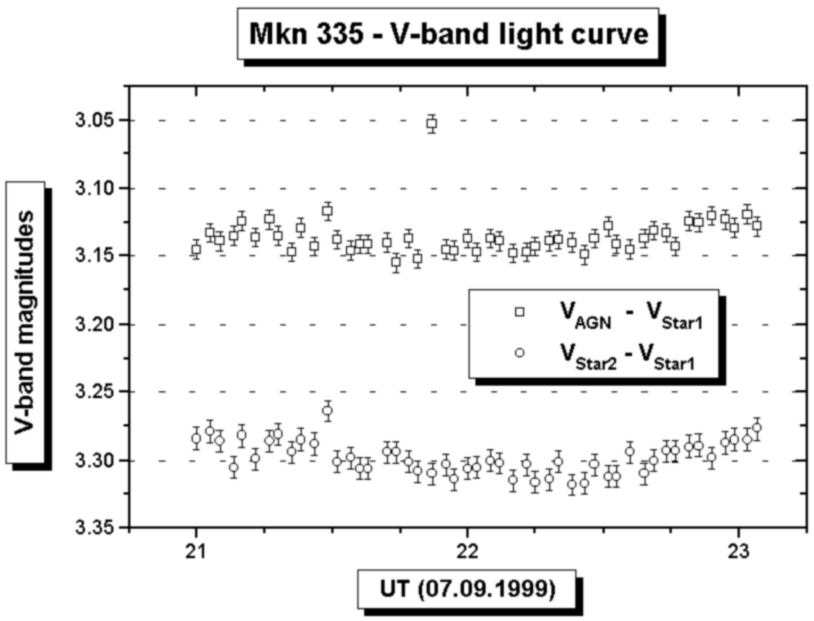


Figure 1: V-band light curves of the monitored Seyfert galaxies and the check stars in respect to the main standard. The photometric errors are indicated by error bars.

References

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