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The Nova and Supernova Star Patrol at Abastumani

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1. The Supernova Star Patrol

The Schmidt telescope (360/333/625 mm) of the Abastumani Observatory is used for photographic observations. It provides a field of 7.3° (80 mm) and a non-vignetted field of 4° (44 mm). For an astronomic film of medium sensitivity (DIN 20, ASA 70) the limiting exposure time is 7–8 m and the limiting magnitude is 16.5. For fine grain emulsions, a 15 m exposure time provides the limiting magnitude of 18.0. Since 1961 systematic photographic (mainly photovisual) observations have been carried out, within the International Cooperation Program of the Supernova Patrol in the direction of 24 selected fields. During a night an average of 10 exposures are taken. About 10,000 exposures have been obtained up to now and 30 Supernovae discovered, of which 10 were first identified in Abastumani (Chuadze 1967; Kimeridze 1971, 1979; Kimeridze et al. 1984, 1988, 1989a,b) In parallel with the patrol observations, photovisual and photographic (sometimes *UBV*) photometry was performed for 9 discovered Supernovae. The observations are still continuing.

We plan to carry out a statistical study of the explosion frequency of Supernovae. The observational data are useful for variable and probable variable star brightness estimation at different epochs. In addition, the Schmidt telescope was also used to investigate eruptive and exploding variable star brightness variations and *B,V* photometry of stars in the Kapteyn Areas.

2. The Nova Star Patrol

Systematic observations of Novae began in the 1920s. About 300 Novae stars have been discovered. Full information about the Novae is given in two catalogues (Kholopov et al. 1985; Duerbeck 1987). One can notice that about 25 per cent of Novae are not classified at all, and for many more the classifications are not reliable. According to Kholopov et al. (1985) it is possible to classify Novae by brightness variations: i.e. fast, slow, very slow and recurrent Nova. Some authors have also described Nova-like classes, including different and non-uniform variable star groups. The Novae stars from various classes have different brightness maxima, but the difference between the maxima of slow and fast Nova is not statistically reliable (Hoffmeister 1990).

The most critical parameter for Novae stars in our Galaxy is the flare frequency. The problem is complicated due to several reasons: a) there were no systematic Nova star patrol observations; b) The discovery of Novae in the galactic plane and especially in the galactic center direction is limited by interstellar

absorption. It is possible to estimate this parameter by extrapolating the value for galaxies similar to our own. Arp (1956) and Sharov (1983) estimated the flare frequency of Novae as 26 yr^{-1} and 31 yr^{-1} respectively, while the Nova patrols in our Galaxy lead to the value 76 $\pm$ 38 yr^{-1} (Liller 1987).

The galactic distribution of Novae also needs further investigation. Fast Novae are uniformly distributed with galactic longitude, whilst slow Novae show a tendency to concentrate towards the galactic center direction. This fact probably shows that there are two types of Novae stars in galaxies like our own (Duerbeck 1990), although this has not been shown for the Andromeda galaxy (Sharov, 1993). Sharov also indicated the expediency of star patrols for Novae in our Galaxy and in Andromeda.

There are also many problems connected with recurrent Novae. It is not known whether all Novae are recurrent. Kaluzny and Chlebowski reported a list of potential recurrent Novae for patrol observations. The objects selected mostly have a low maximum brightness which is statistically correlated with short intervals between the Novae outburst. Only one object from this list - V1017 Sgr - appears as recurrent in Novae catalogues. It should be emphasized that there might be some connection between Novae and nova-like objects (dwarf Novae, simbiotic stars, polars) or planetary nebulae. Only a few polars are known up to now (Kaluzny and Chlebowski), so it is desirable for the Nova star patrol to work in this connection.

Due to all these suggestions, we plan to initiate a Nova Star Patrol at Abastumani using the Schmidt telescope. We have selected 59 fields along the galactic plane in three regions; $0 < l < 30°$, $|b| < 12.5°$; $30 < l < 60°$, $|b| < 7.5$; $60 < l < 360°$, $|b| < 2.5$. The observations will be taken using A660N films in combination with a RG600 filter to provide a spectral band with wavelength range 6000–6700 Å. The exposure times will be 5–6 m with a limiting magnitudes of 16. The whole patrol cycle may be performed over two summer nights. Finally, we would like to note that G. K. Kimeridze would welcome any suggestions for co-operation in the Nova Star Patrol Program.

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