THE ROZHEN NATIONAL ASTRONOMICAL OBSERVATORY: OBSERVATIONAL FACILITIES, RESEARCH ACTIVITIES AND POSSIBILITIES FOR COLLABORATION BETWEEN COUNTRIES FROM SOUTH-EASTERN EUROPE

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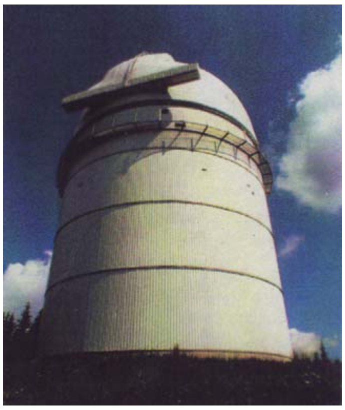
The Rozhen National Astronomical Observatory belongs to the Institute of Astronomy. It is the biggest research facility of the Bulgarian Academy of Sciences and also the biggest observatory for optical observations in the SEE. The Rozhen NAO is situated on peak Rozhen in the Rhodopy mountains, some 25 km from the town of Smolyan. (longitude = -01h 38m 58s, latitude = +41° 41′ 48″ , altitude = 1750 m). It was built in the late 70-ties and officially inaugurated in 1981. The main instrument is a 2 m Ritchey-Chretien-Coude telescope, built by Carl Zeiss Jena, Germany (Fig 1). In the Ritchey focus the field is 1° x 1° (F/8), with 12.9 arcsec/mm. Observations can be carried out either directly with a CCD and filter block, or else with a double channel focal reducer (1). Two highly sensitive CCD cameras are used: the Photometrics AT200 system (SITe chip, 1024 x 1024 , pixel = 24 μm) and the newly introduced VersArray 1300B from Princetone Instruments (1340 x 1300, pixel = 20 μm). The VersArray CCD has been sponsored by UNESCO-ROSTE, in the framework of a joint regional project including Bulgaria, Romania, Serbia and MN and Turkey. This joint project deals with studies of variable stars and the small bodies of the Solar system. In the Coude-focus (F/36), there are 3 different cameras for dispersions of 4 Å/mm, 9 A/mm and 18 Å/mm. There is a set of gratings with the mostly used one of 630 lines/mm.
With 2 px resolution, at 5000 Å and 4 Å/mm the spectral resolution would be R= 27 000 (Fig 2).

The 60 cm telescope is dedicated to photoelectric photometry. It is a Cassegrain (F/12.5) telescope, equipped with an UBV, single channel, photon counting, computer controlled photometer (Fig 3).

The 50/70 cm Schmidt-telescope (5° x 5° field) is presently equipped with a SBIG ST8 CCD (1500 x 1000, pixel = 9 μm, CCD field is: 27.5 x 18 arcmin) . The Schmidt telescope is shown on Fig 4.



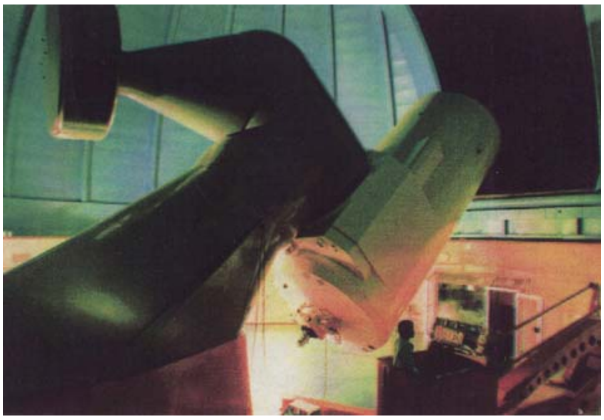


Fig. 1 The dome of the 2-m telescope.

Fig. 1 View of the 2-m telescope

Fig. 2. The Coude spectrograph of the 2-m telescope

The last observing facility in Rozhen NAO is a 15 cm solar coronograph, presently under construction in the Institute of Astronomy. The solar coronograph will be operational by 2005.

In the Rozhen NAO, studies are carried out of different programs, in connection to the institutes scientific departments: Sun, Solar system, Nonstationary stars, Chemically peculiar stars, Stellar atmospheres and envelopes, stellar clusters and Galaxies. The Rozhen NAO is also a major facility for international collaboration. During the 23 years of operation, a great number of project were carried out with international collaboration involved: all countries from Eastern Europe, all neighbouring countries, Germany, Finland, Norway, Russia,UK, Italy, France etc.

The observing conditions in Rozhen NAO are similar to places in the Mediterranean region. There are about 150 observing nights per year (110 for photometry), distributed over two main seasons: 60 % of the clear nights in the summer and autumn and 40 % in winter and spring. The mean seeing is about 2 arcsec. The sky brightness is about 22.2 mag in B per square arcsec. Some observing results are shown below, to illustrate the possibilities of the Rozhen NAO.

Fig. 3. The dome of the 60-cm telescope.

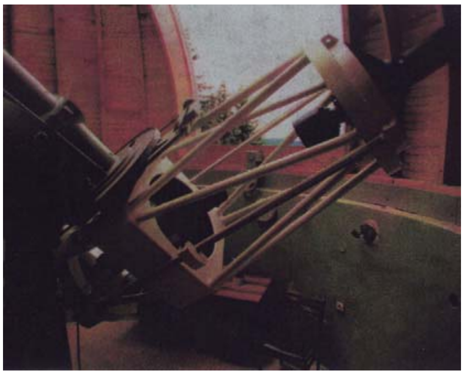


Fig. 3. The 60-cm photometric telescope.

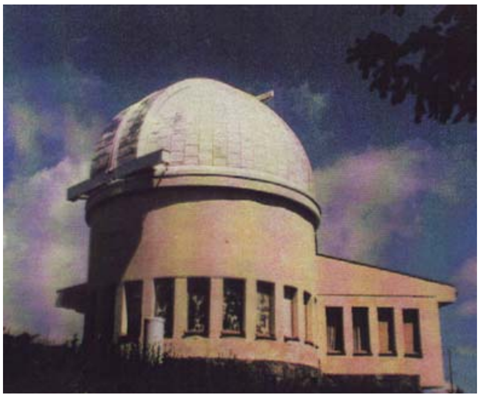


Fig.4. The dome of the Schmidt telescope.

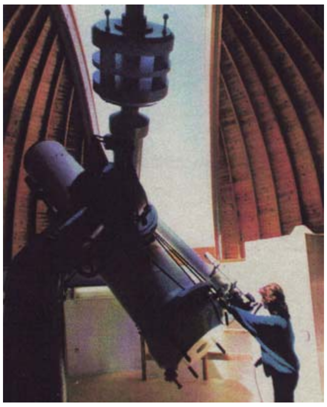


Fig.4. The 50/70 cm Schmidt telescope.

Observation of the Halley comet in 1986, Jan 14, is shown on Fig 5 (courtesy of V. Skodrov and V. Ivanova). The Halley comet was first spotted in Rozhen NAO on Nov 25 , 1984, which is also first observation from Europe.

Observations of the flare star EV Lac and the spotted star BY Dra are shown in Fig 6. Stellar flares are being registered in U filter , with time resolution of 1 s or even 0.1 sec. Spot modulation of brightness can be obtained for amplitudes of several hundreds of mag, with errors being typically 0.003 - 0.005 mag , for bright stars (2).

Fig 7 shows the Wolf-Rayet star WR 140 in 1991 – 2001 (3). For the first time, a photometric dip was registered in Rozhen NAO, around the phase of periastron in that system. The dip is a result of an "eclipse", due to carbon dust building by the colliding stellar winds of the two components. The photometric system on the 60 cm telescope was stable for more than 10 years, making possible such long term observing program.

Fig 8 shows the light curves in UBVRI of the SN 2002ap in M74, observed with all three telescopes in Rozhen (4).

Bulgarian astronomers are open for collaboration and we acknowledge very much the support of UNESCO-ROSTE, which is an important contribution to our regional projects.

References

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3. Panov, K.P., Dimitrov, D., 2001, IBVS 5177.
4. Borisov, G., Dimitrov, D., et al., 2002, IBVS 5264.

Fig. 5. Comet Halley on January 14 1986. The photography is taken with Schmidt telescope of NAO Rozhen by V. Shkodrov and V. Ivanova.

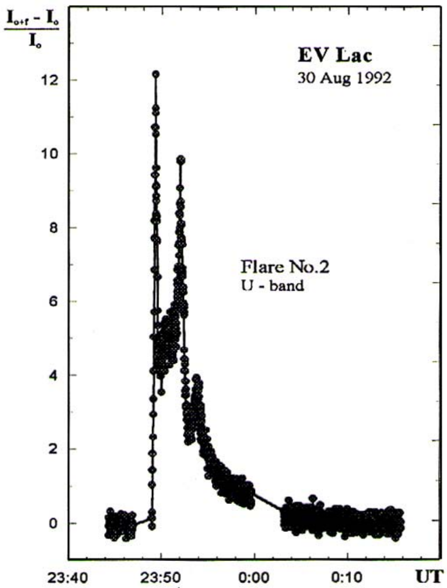
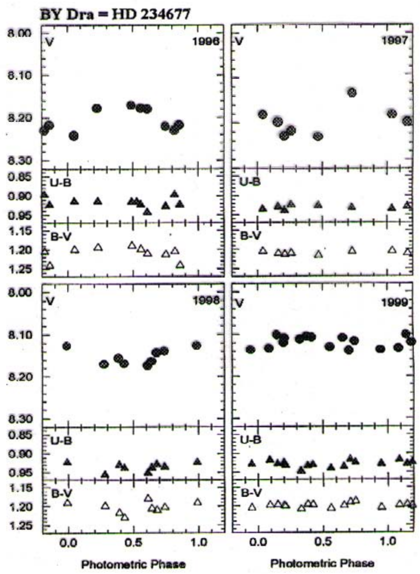


Fig. 6. Flare on EV Lac in U band. 60 cm telescope Rozhen NAO



Spot light curves of the star BY Dra. 60 cm telescope NAO.

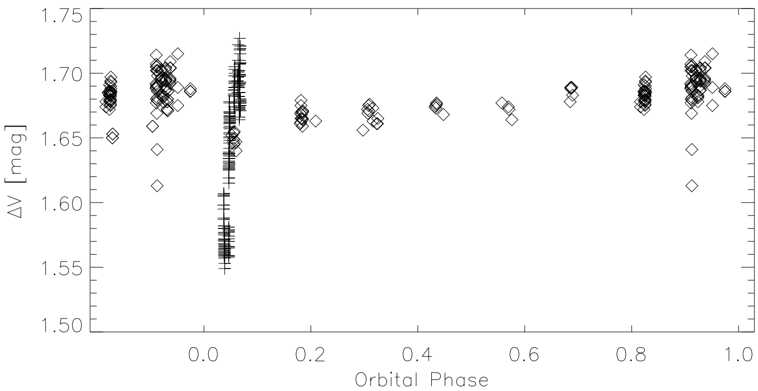


Fig. 7. WR 140 light curve in filter V for 1991 – 2001. 60 cm telescope NAO

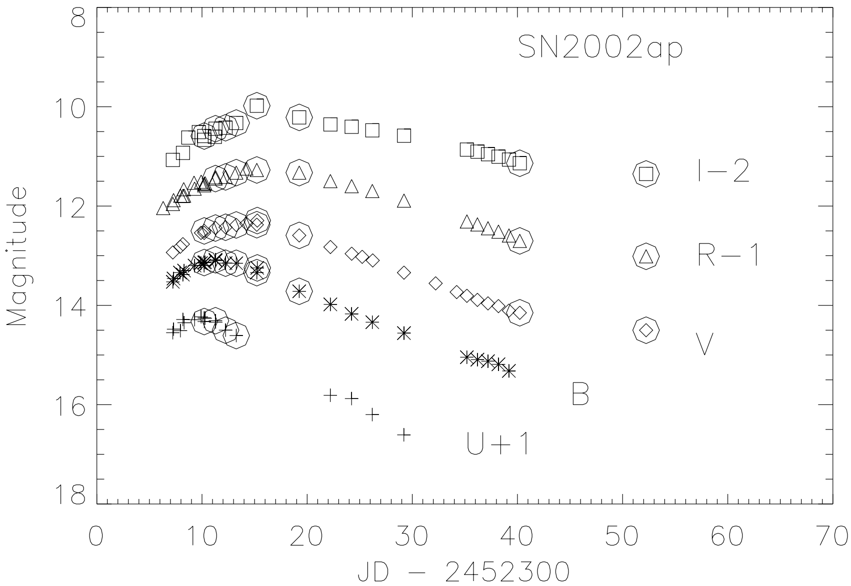


Fig. 8. Light curves in UBVRI of SN 2002ap in M74. 2-m telescope, 50/70 cm Schmidt telescope and 60 cm telescope of Rozhen NAO, with additional data from the literature.