THE 50/70-cm SCHMIDT TELESCOPE AT THE BULGARIAN NATIONAL ASTRONOMICAL OBSERVATORY

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The 50/70 Schmidt telescope at the National Astronomical Observatory (NAO), Bulgarian Academy of Sciences, is an example of the possibilities for a long-term operation and everlasting actuality of these types of telescopes. Originally, this telescope was constructed in the GDR in 1952 and mounted in the Potsdam Observatory, Academy of Sciences of the GDR (as such, it is on the list of West, 1974). In 1979, on the basis of a mutual agreement between the Bulgarian Academy of Sciences and the Academy of Sciences of the GDR, it was transferred to Rozhen, Bulgaria. The principal parameters of the instrument are as follows:
I. Main mirror: diameter: 70cm; material: Tempax; thickness in the centre: 10 cm; radius of curvature: 344 cm.
II. Schmidt-corrector: diameter: 50 cm; material: BK 7; thickness in the centre: 1.8 cm.
III. Objective prism: diameter: 50 cm; material:UBK 7; angle of refraction: 3.5°; average dispersion in the field of H_{γ} - H_{ε} : 820 A/mm.
IV. Focal region: radius: 172 cm; size of plates: 13x13 cm; field: 16.4 sq.deg. (with a Piazzi-Smith corrector, size of plates: 16x16 cm; field: 25.4 sq.deg.); field free of vignetting: $\sim$ 9 cm (3°); focal ratio: 1:3.44.

Since June 1979, when the telescope began to function in Bulgaria, planned investigations have started both of the instrument itself and of the obtained particular scientific researches and observations. During the first three-year period about 1000 plates had been developed for 620 hours of effective observations. For investigating the telescope and establishing the methods of observations, approximately 200 plates had been developed, the basic part of the observations being carried out within the frames of the observational programs, i.e.
- Investigation of non-stable and flare stars in stellar aggregates;
- Photometric investigations of stellar clusters;

M. Capaccioli (ed.), Astronomy with Schmidt-Type Telescopes, 207–209.

- Observations of small planets in the Solar system;
- Investigations of galaxies, etc.

Particular stress in the observational program was layed on observations of flare stars in stellar aggregates of different ages. During these observations at Rozhen (341.5 hours effective observational time) 26 new flare stars and 18 repeated flares in the area of Cygnus, Orion, the Pleiades, etc. were discovered (Tsvetkov, 1982).

The investigation of the telescope, including the Hartmann test of its system (Golev, etc., 1982), showed comparatively good characteristics - the technical constant of Hartmann T = 1.01 arcsec. The experiments on determining the limit star magnitude showed that in a 40-minute exposure of ORWO-ZU 21 plates within the photographic field of the spectrum, up to $19^m.5$ is obtained. The photometric researches showed that up to $1^0.5$ from the field centre, photometric errors are insignificant.

The observations carried out and the observation material obtained thereof offered the possibility some statistical conclusions to be made, characterizing astroclimatic conditions and organization of observations. Similar to other observatories situated in a neighbouring latitude, the summer-autumn observational period was found to be considerably more effective for observations.

The data obtained from the observations offer the opportunity of making an attempt to calculate the efficiency of the observations and their organization as well. With regard to this, for convenience, the quantity k can be defined, referred to as relative efficiency of observations carried out:

$$k = n.m. \qquad (1)$$

where n denotes the number of the plates obtained, while m is the effective exposure time in minutes. In a practical case k is also a function of the parameter φ ($0 \leq \varphi \leq 1$) where φ characterizes above all the meteorological conditions under which observations are being carried out, etc.

Comparing the quantity k calculated for the particular observational periods during the recent three years, it turns out that on the average, observations in the summer-autumn period at Rozhen are twice more effective than in the winter-spring period. For calculating the efficiency of observations made in certain nights of favourable climatic conditions ($\varphi \approx 1$) it is convenient to apply the coefficient $\varkappa$ (kappa) where $\varkappa = k/K$. Here K denotes the absolute efficiency of observations equal to

$$K = T.\frac{T}{E} = T^2/E \qquad (2)$$

where T indicates the entire possible observational time, while E is the optimal exposure of the given telescope,

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depending on its focal ratio and specified in compliance with Baum relation, 1968.

If $\varkappa$ is expressed in percentage, then we have

$$\varkappa = 100.n.m.E/T^2\% \qquad (3)$$

The calculation of the coefficient $\varkappa$ for certain favourable observational nights offers the opportunity for an extra information on the observations to be obtained. In the given case the observations with the 50/70-cm Schmidt telescope at Rozhen showed that during particularly favourable observational nights the value of $\varkappa$ reaches approximately 40%. The calculations give above all an idea of the possibilities for effective work with the instrument, as well as estimation of the quality of organization and planning of observations.

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