Small-Telescope Astronomy on Global Scales
ASP Conference Series, Vol. 246, 2001
W.P. Chen, C. Lemme, B. Paczyński

Russian/Former Soviet Union Experience in Small Telescope Usage for Investigation of Interstellar Matter (ISM) and Nebulae

N.G. Bochkarev

Euro-Asian Astronomical Society, Sternberg Astronomical Institute (SAI), Universitetskij Prospect 13, Moscow 119899, Russia
e-mail: boch@sai.msu.ru

The deepest tradition in ISM study in the optical range was built in Russia/FSU by V.Fessenkov, the founder of Fessenkov Astrophysical (Aph) Institute (AFIF, Kazakhstan) and G.Shain (Crimean Aph.Obs. - CrAO, Ukraine). The tradition was handed over to SAI (Moscow) by I.Shklovski and S.Pikelner, to Abastumani Aph. Obs. (AAO, Georgia), where a catalogue of dark nebulae (Khavtassi, 1960) was produced, and to Byurakan Aph. Obs. (BAO, Armenia).

For a long time 0.3-0.7 m telescopes were used for determination of interstellar extinction in the Galaxy by the standard technique (SAI; Engelhart Astron. Obs. of Kazan Univ., Russia; AAO; BAO and others. The most sophisticated investigations were carried out in Lithuania (e.g. Straizys, 1977; Sudzius, 1974).

The Catalogue of Reflection Nebulae was completed using the data obtained with the AFIF 0.5 m meniscus telescope (Rozkovsky & Kurchakov, 1968). Some nebulae were studied more deeply (e.g. Kurchakov, 1968; Sabitov, 1968; Rozkovsky, 1981). Research of polarization in dim reflection nebulae and imbedded stars was also carried out at AFIF (e.g. Sabitov, 1981; Pavlova & Rspaev, 1985). D.Rozkovsky measured polarization in many dim dust nebulae, including those outside the galactic plane, thus getting information on the nebulae dust properties, and the dust outside the galactic disk. Diffuse galactic radiation was measured by Rozkovsky et al. (1968). The observations were carried out with a Schmidt camera (focal ratio 1:1, focal distance 17 cm).

L.Kondratyeva performed, with a 0.7 m meniscus telescope of AFIF, a large number of spectroscopic and photometric observations of a large sample of planetary nebulae (PN), which allowed to determine their physical characteristics (e.g. Kondratyeva, 1975, 1978, 1985, 1992, 1998). The formation of the nebulae Th4-4 was traced: before 1970, it was a Be star with $T_{eff} = 22000$ K. Presently, it is a compact PN with a 54000 K hot nucleus (Kondratyeva, 1989, 1993).

Characteristics of PN (nuclei variability, binary nature etc.) were studied in detail based on a 25 year long data set obtained at SAI Crimean Lab. (0.6 m and 1.25 m telescopes) by Kostyakova (1999), Arkhipova et al., (2001).

Physical characteristics of many diffuse HII regions and their inner dispersion have been determined; nebulae structure was investigated (e.g. Glushkov et al., 1975). One of the most important results was the discovery of dust rims (bright and dark) around young hot stars (e.g. Glushkov, 1968, 1995). The inner stucture of diffuse nebulae has lately been investigated at BAO with a 1 m Schmidt camera (e.g. Parsamian & Petrosian, 1984).

SAI has a many years long tradition and experience of Fabry-Perot interferometers (FPI) usage for nebulae investigation. T.Lozinskaya and her group

traced, with the 0.48 m, 0.6 m and 1.25 m telescopes of SAI Cr. Lab., the radial velocities distribution pattern in expanding nebulae (all the bright SNR of the Northern hemisphere (e.g. Sitnik et al., 1982) with radial velocities dispersion $\geq$ 15-20 km/s). Lozinskaya (1986) studied nebulae blown by WR-stellar wind and giant bubbles around stellar associations (Lozinskaya et al., 1994), discovered and studied wind-blown bubbles around Of stars.

P.Shcheglov (SAI) and his pupils were the first to use, in the 1960s-1970s, FPI for observations of very faint Hα, Hβ BG emission of the Galaxy. The observations were performed with FPIs 5-15 cm in diameter using no telescope but a tube of a 1-2 degrees field of view. Zhitkov (1970, 1971) discovered and Kutyrev (1985), Shestakova et al. (1988), and, since the 1970s, R.Reinolds (Kutyrev & Reinolds, 1989) all studied very faint Galaxy Hα, Hβ emission (EM = 0.1 - 10 $cm^{-6}pc$); i.e, low density HII regions were discovered in LISM and other regions.

References

Arkhipova, V. P. et al. 2001, Pisma AZh, 27, 122 (As. Lett., 27, 99)

Glushkov, Yu. I. 1968, Trudy AFIF, 11, 84 & 126

Glushkov, Yu. I. 1995, AApTr, 8, 105

Glushkov, Yu. I., Denisyuk, E. A. & Karyagina, Z. V. 1975, A & A, 39, 481

Khavtassi, J.Sh. 1960, The Atlas of Dark Galactic Nebulae. (Tbilisi: Acad.Sci.)

Kondratyeva, L. N. 1975, Pisma AZh., 1, N.10, 14; 1978, AZh, 55, 334; 1985, Astrofizika, 22, 153; 1992, AZh., 69, 1219; 1998, Izvest. AFIF, 4, 93

Kondratyeva, L. N. 1989, As. Lett., 15, 29; 1993, Pisma AZh., 19, 811

Kostyakova, E. B. 1999, Pisma AZh., 25, 457

Kurchakov, A. V. 1968, Trudy AFIF, 11, 56

Kutyrev, A. S., & Reinolds, R. 1989, ApJ, 344, L9

Kutyrev, A. S. 1985, Astr. Tsirk., 1369, 1; 1396, 3

Lozinskaya, T. A. 1986, Supernovae and stellar wind: interaction with interstellar matter (Moscow: Nauka)

Lozinskaya, T. A., et al. 1994, Pisma AZh, 71, 515

Parsamian, E. S. & Petrosian, V. M. 1985, Astrofizika, 20, 495

Pavlova, L. A. & Rspaev, F. K. 1985, Astrofizika, 22, 145

Rozkovsky, D. A. 1981, Astr.Tsirk., 1149, 4

Rozkovsky, A. D. et al. 1968, Trudy AFIF, 11, 66

Rozkovsky, D. A. & Kurchakov, A. V. 1968, Trudy AFIF, 11, 3

Sabitov, Sh. N. 1968, Trudy AFIF, 11, 79

Sabitov, Sh. N. 1981, Astr.Tsirk., 1154, 6

Shestakova, L. I. et al. 1988, Pisma AZh, 14, 60

Sitnik, T. G. et al. 1982, Pisma AZh., 8, 286

Straizys, V. 1977, Multicolor Stellar Photometry (Vilnius: Mokslas Publ.)

Sudzius, J. 1974, Bull. Vilnius Obs., 39, 3 & 18

Zhitkov, V. F. 1970, Astr. Tsirk., 578, 5; 1971, 655, 4