

Space Research in Baldone Observatory 2017

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Abstract

At observatory are carried out the U, B, V, R, I photometry and low resolution spectroscopy of carbon stars, the monitoring of small bodies of Solar system, the digitizing and processing of the Baldone Schmidt telescope wide field 24300 plate archive. Astronomers are working to popularize astronomy.

Key words: carbon stars, asteroids, astronegatives

Introduction

At Baldone observatory astronomers operate with Schmidt-type 1.2 meter telescope installed with four degree objective prism and one square degree STX-16803 CCD. It is the twelfth largest Schmidt telescope in the world manufactured in Germany in 1966. The studies of space in observatory connect with possibilities of Baldone Schmidt telescope. Traditional field of investigation are carbon stars.

Carbon Star Photometry and Spectroscopy

Photometry of carbon stars revealed that some of these stars have periods of light variation of the first and second order and allowed to discover new type of variability of late stars – DY Per.

The investigation of properties of carbon stars in Large Magellanic Cloud by Maun [1], give possibilities to evaluate the absolute magnitude M_k of late carbon stars. The investigation of dust distribution in Milky Way galaxy by Schlegel et al. [2] and distribution of interstellar absorption by Arenou et al. [3] allow detect values of interstellar absorption A_k till carbon stars. Thus possible to determine the distances to the carbon stars by equation:

$$5 \lg r = K - M_k - A_k - 10,$$

And investigate the carbon stars distribution in Galaxy [4, 5].

The spectroscopy of low resolution of carbon stars in Baldone observatory gave methodology to obtain $T(\text{eff})$ [6] of their atmospheres and thus possible to understand the evaluation phase of these stars. There are more than 450 carbon stars discovered in observatory, besides 53 are discovered in the last years.

Investigation of Small Bodies of Solar System

From 2008 the monitoring of small bodies of solar system are carried out in Baldone observatory. 70 new asteroids were discovered, 6 NEOs, 11 numbered and labeled. 5434 astrometric positions of 1488 asteroids are calculated in cooperation with Institute of Theoretical Physics and Astronomy, Vilnius University. Orb-Fit v.4.0 program, which take into accounts planets and Ceres, Pallas, Vesta perturbations, is used in ephemerides calculations in case of asteroids of Main belt, but Orb-Fit v.4.2, which take into accounts 25 objects perturbation, in cases of Trojan and Centaurus asteroids [7, 8].

Baldone Observatory Archive

The Baldone archive contains the astrophotos of Schmidt telescope of the Institute of Astronomy of the University of Latvia in the period 1967-2006. The archive contains more than 22000 direct and 2300 spectral photos of various sky regions (Figure 1.). Detailed information on the types of photo materials and color filters used as well as on most frequently photographed sky fields or objects are given in [9].

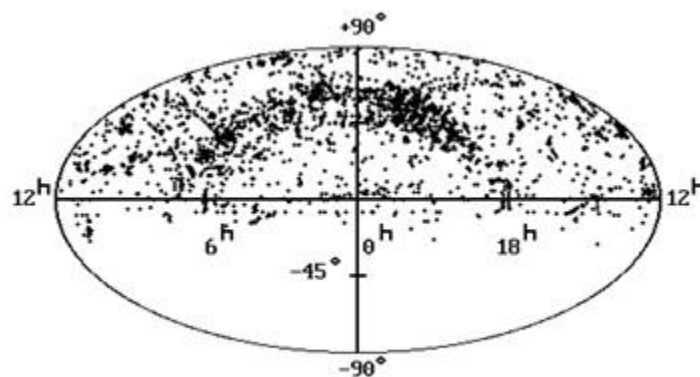


Figure 1: Distribution of the 22000 direct observations on sky

The images were digitized by the scanners Epson Expression 11000XL. Standard image processing was performed in the environment of LINUX/MIDAS/ROMAFOT with an advanced set of original programs, which were developed in the Main Astronomical Observatory of National Academy of Sciences of Ukraine [10] and Research Institute Nikolaev Astronomical Observatory. The equatorial coordinates and magnitudes of all objects on the plates are obtained. Additional studies were conducted of the carriage mechanics and optical distortion [11]. Now we carry out two project in cooperation with Main Astronomical Observatory of Kiev using Baldone archive data – search the asteroids and comets, and obtaining the U magnitudes of stars and galaxies on the North celestial sphere.

Popularization of Astronomy

From 2013 in Baldone observatory in Schmidt telescope pavilion run Planetarium? Visitors have possibilities to travel to stars, nebulas, galaxies and planets of Solar system. The popular lectures in astronomy participated more than 3000 visitors in the last years (see Fig. 2.).

Astronomers of observatory take part in edition of the popular magazine Starry Sky. It is the oldest Latvian edition, which is published in more than 50 years.

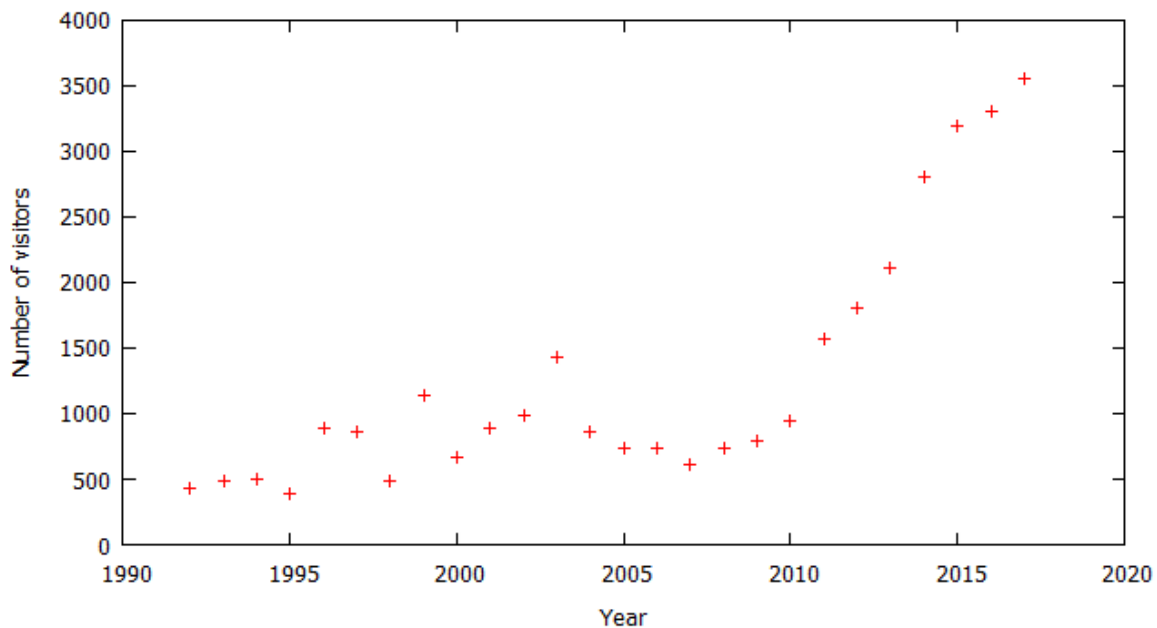


Fig. 2. Visitors in the Baldone Observatory Planetarium

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