

TELESCOPE “MILANKOVIĆ”: MOUNTING, PRESENT AND FUTURE WORK

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Abstract. In this contribution we present the final stages of the procurement of the telescope “Milanković” purchased by the Astronomical Observatory of Belgrade (AOB) using the funds of the FP7 REGPOT project BELISSIMA with the support of the Ministry of Education, Science and Technological Development of the Republic of Serbia. The final activities of the BELISSIMA project and the successful mounting of the 1.40 m telescope “Milanković” at the Astronomical Station Vidojevica (ASV) in 2016 are presented. We outline the present activities related to the ASV and we also describe observational projects currently active. Finally, we present the plans for the future related to the purchase of new instruments, continuation of present and initiation of new observational projects and future collaborations.

1. INTRODUCTION

The initial phases of the purchase of the 1.40 m telescope “Milanković” were described in Samurović (2017). We update here the information presented at the last National Conference of Astronomers of Serbia. The telescope “Milanković” was purchased through the BELISSIMA FP7 (Seventh Framework Programme) project (call FP7-REGPOT-2010-5) with the support of the Ministry of Education, Science and Technological Development of the Republic of Serbia. BELISSIMA started in July 2010 and was, due to the problems in the purchase and manufacturing, extended by the European Commission twice: first in 2013 and then in 2015. BELISSIMA successfully completed all the foreseen activities on 30 June 2016: the most important task was the mounting of the “Milanković” telescope, and this was done at the beginning of June 2016 (see Figure 1). The telescope was manufactured by the Austrian company Astrosysteme Austria (ASA) using the LOMO optics from Russia for the mirrors.

First light of the “Milanković” telescope showed that the observing conditions at Vidojevica are excellent: the seeing measured was found to be equal to 0.7 arc seconds which is comparable to the best observing sites in the world, such as Chile. These first results confirmed that both mechanics and optics are of excellent quality. In Figure 2 the first light image is shown (taken on 7 June 2016): this is the well-known spiral galaxy M51. The results also strongly suggest that the choice of the Vidojevica mountain was the right option for the new observing site of the Astronomical Obser-



Figure 1: The “Milanković” telescope in the temporary pavilion.

vatory of Belgrade. The telescope was mounted in the temporary pavilion procured using the funds of the Serbian Ministry of Education, Science and Technological Development. Presently (Autumn 2017) it is still there, but as soon as the new pavilion is completed, the “Milanković” telescope will be transferred to the new building (see below).

2. TELESCOPE “MILANKOVIĆ”: MAIN CHARACTERISTICS

The main characteristics of the “Milanković” telescope are:

- Mechanics: Astrosysteme Austria (ASA)
- Optics: LOMO, St. Petersburg, Russia
- Primary mirror diameter: 1.40 m
- Focal length: 11.2 m (f/8)
- Mount: alt-azimuth
- Weight: 8.5 tonnes
- Height: 4.5 meters
- Tubus: Open Truss Tube
- Motorized main and secondary mirror covering (computer-controlled)
- Motorized secondary mirror focuser (computer-controlled)
- Drive: Direct Drive Torque motors
- Nasmyth and “bent” Cassegrain foci



Figure 2: First light image: M51.

At the time of this writing (early November 2017) the building of the new pavilion is nearly completed and it is expected that the new, professional dome, manufactured by the reputable Italian company Gambato will be mounted in spring 2018. This will allow full robotization of the “Milanković” telescope.

3. TELESCOPE “MILANKOVIĆ”: INSTRUMENTS

The following instruments are presently available for use with the “Milanković” telescope.

- New ANDOR iKonL CCD camera: 2048×2048 pixels, pixel size is $13.5 \times 13.5 \mu\text{m}$, field of view at the telescope $9' \times 9'$. The camera was procured in September 2017 and is being tested.
- Backup CCD camera Apogee U42 with the same characteristics as the above-mentioned iKonL CCD camera.
- New ANDOR iKon3 Ultra 897 CCD camera: 512×512 pixels, size of the pixel $16 \times 16 \mu\text{m}$. The camera was procured in April 2017 and is presently being tested.
- Spectrograph SpectraPro 2750 by the Princeton Instruments. Type: Cherny-Turner with 3 gratings 300, 600, 1200 lines/mm, with resolutions 44, 22, $10 \text{ \AA}/\text{mm}$ and spectral ranges 1120, 560, 250 \AA .

4. OBSERVATIONAL PROJECTS

The presently active (and currently planned) observational projects are: (1) Eclipsing binary systems, (2) Visual double and multiple stars, (3) WEBT, GAIA follow-up,

(4) Asteroids, (5) Defining of the absolute coordinate system using quasars, (6) Photometry/spectroscopy of nearby spiral and elliptical galaxies, (7) Dwarf galaxies and tidal streams and (8) Shell galaxies.

In the future, it is planned that the already existing collaborations will continue (such as the work with the researchers from the Bulgarian Academy of Science on cataclysmic variable stars) and the new ones will start. In the Book of Proceedings of the international BELISSIMA conference (Samurović, Vukotić & Mičić 2013), as well as in proceedings of the two BELISSIMA workshops (Samurović, Vukotić & Martinović 2013, Samurović *et al.* 2016) various useful observational projects are presented. The rulebook for observations with the “Milanković” telescope is in its final stages of preparations and will be available soon for potential observers.

One important event related to the future observational projects from the Astronomical Station Vidojevica took place in Autumn 2017, immediately after the Serbian Astronomical Conference: the Serbian-Italian Astronomical Workshop (SIAR) was held on 31 October 2017 at the Pupin Institute in Belgrade with approximately 50 participants. The prominent astronomers from Italy came to Belgrade to discuss the future observing projects and shared their experiences related to various astronomical observations, and other astronomical and technical and computational possibilities which include the usage of astronomical instruments, reductions, storage and analysis of the observed material.¹

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References

- Samurović, S.: 2017, in Proceedings of the of the XVII National Conference of Astronomers of Serbia, Belgrade, September 23-27, 2014, S. Šegan & S. Ninković (editors), *Publications of the Astronomical Observatory of Belgrade*, No. 96, pp. 323-330.
- Samurović, S., Vukotić, B. & Mičić, M. (editors): 2013, “Future Science With Metre-Class Telescope”, Proceedings of the International BELISSIMA conference, Belgrade, 18-21 September 2012, *Publications of the Astronomical Observatory of Belgrade*, vol. 92, pp. 1-212, ISBN: 978-86-80019-61-1.
- Samurović, S., Vukotić, B. & Martinović, N. (editors): 2013, “BELISSIMA Workshop: Science with 1.5m Telescopes”, Belgrade, 13-14. 10. 2011, CDROM, ISBN 978-86-80019-59-8.
- Samurović, S., Jurković, M., Jovanović, M. (Milena), Martinović, N., Stojanović, M. & Jovanović, M. (Miljana) (editors): 2016, “Second BELISSIMA Workshop: First Light of the Milanković Telescope”, Vidojevica (Prokuplje), 06-07. 06. 2016, CDROM, ISBN 978-86-80019-75-8.

¹The Web site of the workshop is <http://siar.aob.rs>