

**HISTORY OF THE “LVIV-1831” SLR STATION IN LVIV, UKRAINE.** Ya. T. Blahodyr<sup>1</sup>, A. I. Bilinsky<sup>1</sup>, Ye. B. Vovchuk<sup>1</sup>, N. V. Virun<sup>1</sup>, K. P. Martyniuk-Lototsky<sup>1</sup>, S. V. Apunevych<sup>2</sup>. <sup>1</sup>Astronomical Observatory of Ivan Franko National University of Lviv (8, Kyryla i Methodia str., Lviv, Ukraine, slr1831@ukr.net), <sup>2</sup>Chair of Experimental Physics, Faculty of Physics, Ivan Franko National University of Lviv (8, Kyryla i Methodia str., Lviv, Ukraine, sofiya.apunevych@gmail.com).

**Introduction:** The observations of satellites at station “Lviv-1831” (Ukraine) began at very beginning of the “Space Age”. In early 1956, the government of Soviet Union has issued a resolution with objective defined as the launch of first artificial satellite of the Earth. Observations were planned in advance, so for that purpose specialized stations were organized at the series of universities and Astronomical observatories. At Lviv University the station for visual observations of artificial satellites was established in August of 1956, under the supervision of Samuel Kaplan and was assigned with the number 1031.

The first successful observation of the artificial satellite was conducted in the night of 10th October, 1957. The photos were taken of launch vehicle of the first artificial satellite. That was the beginning of the observations of the artificial satellites in Lviv.

Visual observations were carried out with astronomical tubes “AT-1” (D = 50 mm, field of view 11 deg, visual magnification 6x, magnitude up to 9m), later with “TZK” binocular (D = 80 mm, field of view 7x10 degrees, magnitude up to 10m). Photographic observations were performed by means of upgraded photo camera “NAFA-3S-25”. Precise time-signal service included radio receiver, oscilloscope and printing device. The programmes for observations were determined by the center of operations, “Cosmos”, and the observational data of high quality were dispatched to the Data Center in Moscow. Also, the positional observations (visual at the early stages, then the photographic) were held till the 1968.

From 1960 till 1968 Lviv Astronomical Observatory was led by Olexander Lohvynenko. During this period the optical and data processing facilities have been constantly improved, and new techniques of observation were developed as well. In particular, the produced at the Observatory time fixing equipment allowed to achieve the precision of 0.5 ms, for high-velocity satellites.

In 1970's the photometric observations of the artificial satellites have gained momentum, and appropriate hardware was developed along with software. The first own development was the photometer based on AFU-75. The next step was to implement the digital methods for data acquisition, the CCD camera for imaging, and the real-time data processing.

In 1988 the Lviv station received the new instrument, LD-2, the first-generation laser ranging telescope. The telescope LD-2 was mounted and justified by O. Logvynenko and team. And this was the beginning of the laser ranging in Lviv. The LD-2 was equipped with ruby laser (694 nm), providing the accuracy of ranging about 1.5 m, and there was no way to improve this instrument, so very soon the LD-2 was replaced by more modern one.

**Nowadays.** Since 1998 the Lviv station involves one of the largest telescopes in Ukraine, the TPL-1M, with main mirror of 1000 mm, the laser-pulse transmitter SL-212 with output power of 1TW, and receiving / detection system, the unique development of Latvian Institute of Electronics, ensuring the precision at the level of picoseconds. The station corresponds to the third generation of SLR according to the international classification. In 2002, the Lviv SLR station was included into the the International Laser Ranging Service (ILRS) network, under acronym LVIL, the international code of system is Lviv-1831 and 12368S001 for the dome, as well as into the national network of Ukrainian center of determination of the Earth Orientation Parameters at Main Astronomical Observatory of the NAS of Ukraine. The SLR station measures the ranges to the special-purpose satellites in orbits varying from 800 km to the 25000 km in heights.

The national programme “The creation and development of state service of unified time and standard frequencies” is fulfilled in partnership with the Ukrainian Centre of Determination of the Earth Orientation Parameters. The data of observation are published in EUROLAS database of DGFI/ILRS Global Data Center and databases of Ukrainian Centre of Determination of the Earth Orientation Parameters.

Since creating of Ukrainian Optical Facilities for Near-Earth Space Surveillance Network (UMOS), the “Lviv-1831” staff is working on joint projects. Its strategic tasks include near-Earth space research (from LEO to HEO), and the studies of motion of selected objects by development and improvement of theory, models and algorithms. Since 2005 “Lviv-1831” station has also returned to the positional observations of the artificial satellites, in parallel to laser ranging.