1. Brief History

The Research Institute of Astronomy of V. N. Karazin National University in Kharkiv was founded in 2002 on the basis of the Astronomical Observatory of the University, one of the eldest observatories in Ukraine. Our Observatory was founded by Prof. G. V. Levitskiy (1852–1917) in 1883 (see Fig. 1), though astronomical studies at Kharkiv University began in 1808 when a laboratory equipped with astronomical instruments was opened.

Since the foundation many famous scientists worked at the Observatory. Prof. L. O. Struve (1858-1920) was a founder of Kharkiv astrometry and stellar astronomy. The famous astrophysicist Academician V. G. Fesenkov (1889-1972) started planetary studies at the Observatory. Prof. B. P. Gerasimovich (1889-1937) originated here theoretical astrophysics. Later, in 1930's, he was the Director of Pulkovo Observatory (Russia). American astronomer Otto Struve (1897-1963) started his scientific career in Kharkiv University; as is well-known, later he headed a number of American astronomical institutions and was the President of the International Astronomical Union. Famous scientist Academician N. P. Barabashov (1894–1971) began in 1918 his systematic studies of the Moon and planets in Kharkiv (see Fig. 2). This gave the origin of many recent planetary investigations at our Institute. N. P. Barabashov discovered the lunar backscatter effect, the analogues of which are now deeply studied in different fields of physics.

During almost 110 years astrometric measurements continued giving significant inputs for several fundamental catalogues. In 1935 a spectroheliograph, the first instrument of such a kind in the USSR, was designed and constructed. Then the monitoring of Solar activity was organized giving the origin of studies in Solar physics at the Observatory. In 1933 the Kharkiv Time Service as a component of the International Time Service began its daily routine work. Many other investigations were carried out, however, the main results of Kharkiv astronomers were obtained in the field of planetary science. Information about the Moon's surface, Martian surface, atmosphere and dust storms, studies of the photometric properties of Venus, Jupiter, and Saturn obtained by researchers of our Observatory in 1950-70’s ensured, in particular, greater efficiency of the first Soviet planetary space missions. Intensive work related to the design of spacecraft astronavigation systems was performed in 1967–1988. Recent planetary studies in the Institute are related to telescope photometric and polarimetric observations

of asteroids, comets, and the Moon. Kharkiv astronomers analyze results of space missions to the Moon (Clementine, Lunar Prospector, and Smart-1), Mars (Mars Global Surveyor), Venus (Pioneer-Venus, Magellan, and Venera 13-16), and Phobos (Phobos mission). Since the end of the 60's successive efforts were undertaken to develop image-processing algorithms for high-resolution imaging with ground-based optical telescopes. During last time important studies on laboratory, computer, and theoretical modeling of light scattering by regolith-like surfaces were carried out.

Figure 1. Grigoriy V. Levitsky (1852-1917), the founder of Kharkov Astronomical Observatory

Figure 2. Nikolay P. Barabashov (1894-1971), the founder of planetary schools of thought in Kharkiv University

Figure 3. Telescope AZT-8 of Institute of astronomy

Figure 4. The dome of telescope Mertz and building of Kharkov University

Instruments

The main instruments of the Institute are the 0.7-m reflector AZT-8 (see Fig. 3), the spectro-heliograph, and the solar telescope AFR-2. For educational purposes the 20 cm reflector AZT-7, Repsold meridian circle, and the 20 cm Zeiss refractor are used. The coherent-optical device, allowing one to produce Fourier transformation of images and to measure scattering properties of objects with complicated structure, was registered as the National Property of Ukraine. At present time this device is used for laboratory measurements of the backscattering effect of particulate surfaces at very small phase angle (starting from 0.002°). Our observers have had opportunities to work with powerful instruments at other observatories including the NASA/ESA Hubble Space Telescope (HST), the 8.2-meter telescope at the Paranal Observatory, and the 6-meter BTA telescope in Russia (SAO RAS).

Institute Structure

The Institute has two territories. The first one is at the center of Kharkiv, near the National University building (see Fig. 4). The second one, Chuguev Observational Station, is located at 75 km to south-east from Kharkiv. In the last years the scientific staff of the Institute and the chair of astronomy comprises 35 researchers (4 teachers) in permanent positions including 7 Doctors of Science (Professors) and 18 Candidates of Science (PhDs). The supporting staff is 25 persons. The researchers are organized in four departments and one laboratory (Fig. 5-10):

- Department of Physics of Asteroids and Comets (headed by Prof. D. F. Lupishko);
- Department of Remote Sensing of Planets (headed by Prof. Yu. G. Shkuratov);
- Department of Astrophysics (headed by Dr. Sci. V. N. Dudinov);
- Department of Planetary and Solar Physics (headed by Dr. V. V. Korokhin);
- Laboratory of Astrometry (headed by Dr. P. N. Fedorov).

The teachers are organized in Chair of Astronomy headed by Dr. A. M. Gretskiy.

Our Institute has a museum and a library: above 50.000 of the principal astronomical and scientific periodicals and books, including folios from private V. N. Karazin and L. O. Struve libraries. The museum has instruments delivered to Kharkiv in 1808 by J. S. Huth who was the first astronomer in Kharkiv University.

Figure 5. Department of Astrophysics. From left to right: Alexander P. Zleleznyak, Igor E. Sinel'nikov, Alexey Sergeyev, Vladimir N. Dudinov (Head of Dep), Alexey E. Kochetov, Victor G. Vakulik, Elena Y. Bannikova, Victoriya S. Tsvetkova, Gleb Smirnov, Vladimir V. Konichek

Figure 6. Department of Remote sensing of planets. From left to right: Vladimir A. Psarev, Sergey Y. Gerasimenko, Dmitriy G. Stankevich, Nikolay V. Opanasenko, Larisa G. Istomina, Dmitriy V. Petrov, Larisa V. Starukhina, Tatyana I. Suchkova, Sergey Y. Bondarenko, Yuriy G. Shkuratov (Head of Dep.), Andrey A. Ovcharenko

Figure 7. Department of Physics of Asteroids and Comets. From left to right, first line: Nikolay N. Kiselev, Irina N. Belskaya, Dmitriy F. Lupishko (Head of Dep.), and second line: Fedor P. Velichko, Vasiliy G. Shevchenko, Vasiliy G. Chorniy, Yuriy N. Krugliy

Figure 8. Department of Planetary and Solar physics. From left to right: Oksana Shalygina, Yuriy I. Velikodsky, Victor V. Korokhin, Evgeniy Shalygin, Inna L. Belkina, Leonid A. Akimov

Figure 9. Laboratory of Astrometry. From left to right: Nikolay S. Olifer, Vladimir A. Zakhozhay, Lidiya G. Opanasenko, Petre N. Fedorov, Vitaliy S. Filonenko, Andrey A. Myznikov

Figure 10. Chair of Astronomy of Kharkiv University. From left to right, first line: Andrey M.Getskiy (head of chair), Nikolay N. Evsukov, Valentina I. Latsko, Yuriy V. Alexandrov, and Yuriy G. Shkuratov, second line: Petre N. Fedorov, Vladimir A. Zakhozhay, Vasiliy G. Shevchenko, and Dmitriy G. Stankevich

Scientific Activity

The basic studies of the Institute are:

- composition and structure characteristics of the lunar and planetary surfaces and atmospheres, which are estimated with combining ground-based telescope and spacecraft observation data;
- physical properties of minor planets and comets with applications to the impact hazard problem;
- experimental and theoretical modeling of light scattering by dust particles and particulate surfaces;
- photometric monitoring of brightness variations in gravitational lens systems and investigation of gravitational lensing phenomena;
- solar activity in the chromosphere with solar monitoring;
- meridian and positional astrometry using photoelectric and CCD-methods.

Since the foundation Kharkiv astronomers have published near 3200 papers. At present time the number of peer-reviewed publications including international journals (like Icarus, Astronomy and Astrophysics) and abstracts is about 100 each year.

Educational Activity

Scientific researches and education in Kharkiv National University are closely associated. About ten astronomy students graduate every year. During six post-war decades about 400 qualified astronomers graduated from Kharkiv University. Unfortunately, most of the students are not going to make a career in astronomy, nevertheless, about 100 of our students have been awarded the Candidate (PhD) degree, and 25 persons were awarded the Dr. Sci. degree.

Community Recognition

Several astronomers of Kharkiv National University are members of International Astronomical Union, European Astronomical Society, and American Astronomical Society. Our scientific achievements are highly appreciated: 32 objects of the Solar system are named in honor of Kharkiv astronomers. Four laureates of the Ukrainian State Prize and four laureates of the Prizes of National Academy of Sciences of Ukraine are working at the Institute. Kharkiv astronomers are constant reviewers of several international journals, like

Icarus, Journal Geophysical Research (Planets), Astrophysical Journal, Planetary and Space Science, and others.

International Cooperation

Astronomers of Kharkiv National University work in close co-operation with their colleagues from astronomical institutions of Ukraine, Russia, Uzbekistan, and other countries of the former USSR, and USA, France, Germany, Italy, Finland, Czech Republic, Japan, Spain, Argentina, Bulgaria, Sweden, and Poland.

Prof. Yuriy G. Shkuratov, Editor.

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