

ASTRONOMY IN ARMENIA: PRESENT STATUS AND FUTURE TRENDS

OVERVIEW OF ASTRONOMY IN ARMENIA

Armenia is one of the most ancient countries with advanced astronomical knowledge distinctly manifested by a vast number of signs and monuments from ancient and middle ages.

Modern astronomy in Armenia begins with the foundation of the Byurakan Astrophysical Observatory (BAO) in 1946 by the eminent scientist of the XX century Victor Ambartsumian (1908-1996).

From the very beginning studies of cosmic instabilities at various scales became the main characteristics of the science activities in Byurakan. The discovery of stellar associations and proving the existence of young stars (1947) as well as the idea of activity of galactic nuclei suggested by V.A.Ambartsumian (1958), discovery and study of many Seyfert galaxies and QSOs, discovery of more than 1000 flare stars, dozens of Supernovae, hundreds of Herbig-Haro objects and cometary nebulae, and valuable results in the field of radiative transfer theory, have been the main scientific achievements of the Byurakan astronomers. The First and Second Byurakan surveys (FBS, 1965-1980, and SBS, 1974-1991) conducted with the tireless efforts of another famous Armenian astronomer, Beniamin Markarian (1913-1985) brought to light the Markarian galaxies and SBS objects, now studied by many astronomers all over the world.

Surveys and search for new objects are the traditional field for the Armenian astronomers: Markarian, Arakelian and Kazarian galaxies, and Shahbazian groups are well known to the astronomical community. This tradition is being continued: searches for blue stellar objects and late-type stars; Herbig-Haro objects, H-alpha stars and stellar jets; optical identifications of IR, radio and X-ray sources, are among the main subjects of BAO's present activities. Other fields of investigations include the theory of compact cosmic objects, and mathematical physics.

After the disintegration of the Soviet Union and the beginning of the economic crisis, the Armenian astronomers, among all other scientists, found themselves in an extremely hard situation. Many of them left Armenia for long periods, others left the field of science for other occupations. However, most of them still work in astronomy. At present, BAO has 75 researchers, including 12 Doctors of Science and 38 Candidates of Science (Ph.D.). There are 3 scientific divisions and 11 small research groups at BAO.

The main scientific instruments at BAO are: the 2.6m telescope (equipped with ByuFOSC and SCORPIO focal reducers, and VAGR multi-pupil spectrograph), the 1m and 0.5m Schmidt telescopes, a few other telescopes of 40-60 cm size, and the PDS

microdensitometer. BAO has a large archive of photographic plates, including the Byurakan surveys, 2650 plates, containing information on some 20,000,000 low-dispersion spectra of objects of the entire Northern sky and a part of the Southern sky at high galactic latitudes ($|b| > 15$), over an area of 17,000 sq. deg.

The Byurakan astronomers have collaborations with scientists from France, Germany, Italy, UK, Spain, Russia, USA, Mexico, Japan, China, India, and other countries. Though the funding of science in Armenia is at a very low level, the Byurakan astronomers continue to work actively due to these international collaboration and small grants. There are 4 other institutions in Armenia besides BAO engaged in research in astronomy:

- Yerevan State University (YSU): Departments of Astrophysics (extragalactic astronomy), Theoretical Physics (theory of neutron stars and other superdense configurations) and General Physics (theory of neutron stars, galaxy dynamics);
- Garni Space Astronomy Institute (space astronomy). Experts in space instrumentation who had constructed the first Soviet space observatories work at Garni, in addition to 4 astronomers;
- Yerevan Physics Institute (YerPhI): Theoretical Physics Division (cosmology and gravitation) and Cosmic Ray Division (high-energy astrophysics);
- Institute of Radioastrophysical Measurements (radioastronomy). It has a spherical 54m radiotelescope working in a synchronous mode with a 2.6m optical mirror.

There are about 25 astronomers (and physicists working on astronomical topics) in the above mentioned four institutions. Altogether, at present about 100 astronomers work in Armenia. 28 Armenian astronomers are IAU members and 25 are EAS members.

The Armenian Astronomical Society (ArAS) was founded in 1999 to promote contacts and collaboration between the Armenian astronomical institutions and also with astronomers working in other countries. 56 astronomers are ArAS members at present.

BAO has also had a rich tradition is hosting international Symposia and Colloquia for the IAU, many on topics related to AGNs.

ASTRONOMY IN THE NEXT DECADE

Some two dozen international projects are currently active in Byurakan and other institutions, including studies of young stellar objects, variable stars, search and studies of AGNs, observational cosmology, radiative transfer theory, as well as the digitization of the Byurakan surveys (FBS and SBS). Some Armenian astronomers are engaged in observational projects using space telescopes: HST and SIRTF. A number of new collaborations are being established at present.

Due to economic difficulties in Armenia it is not anticipated that the government will invest significantly in astronomy in the future. In astronomy, all efforts will be directed to maintain the existing infrastructure and human resources, and for updating the available equipment, including telescopes. On the other hand one of the most important issues is how to attract and support young new talent in astronomy. New mechanisms should be developed for providing attractive working conditions for young scientists. One possible way in helping this situation is to have closer integration with international projects and exchange of young astronomers with western observatories.

The ongoing project of digitization of the Byurakan surveys will result in a database of the largest spectroscopic survey with data on 20,000,000 objects at high galactic latitudes. Collaboration has been established with the Hamburg Quasar Survey team to combine the two low-dispersion spectroscopic databases to make a significant contribution in the astrophysical virtual observatories. With relatively low funding it is possible to conduct new research projects using the Byurakan surveys heritage.

Since there is no other observatory in the region with similarly rich background and necessary infrastructure, BAO could become a regional center for teaching astronomy and training young astronomers from neighboring countries. There are many astronomers actively working in various international astronomical centers who were trained in BAO some decades ago. This tradition should be restored using our long experience and with the assistance of the interested international organizations.