Issue 158/ October 2022



## ARMENIAN ASTRONOMICAL SOCIETY

# **ArAS Newsletter**

### GRIGOR GURZADYAN 100

Byurakan Astrophysical Observatory - a Must-Visit Destination



AGOP TERZAN 95

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#### LOCAL NEWS

#### **BAO Scientific Council 2022-2027 Elected**

On October 3, the election of the scientific council 2022-2027 of the Byurakan Astrophysical Observatory was held. According to the legislation, both the scientific and engineering staff of the observatory took part in the voting.

The election committee included chairman Gagik Ter-Kazarian and committee members Hayk Abrahamyan, Hasmik Andreasyan and Gor Mikayelyan.

As a result of the closed voting, 9 BAO researchers got elected as members of 2022-2027 scientific council: Principal research associate Tigran Magakian, Leading research associate Haik Harutyunian, Leading Research associate Ruben Andreasyan, Leading Research associate Ararat Yeghikyan, Leading



Elections of Scientific Council 2022-2027. BAO.

Research associate Elena Nikoghosyan, Principal Research associate Gagik Ter-Kazarian, Senior Research Associate Hovhannes Pikichyan, Leading Research associate Tigran Movsessian and Senior Research associate Arus Harutyunyan.

The elected members, together with BAO director Areg Mickaelian and one representative of young researchers (Anahit Samsonyan) form the scientific council for 2022-2027.

#### Byurakan Astrophysical Observatory – a Must-Visit Destination

On October 17, the Byurakan Astrophysical Observatory (BAO) hosted the participants of the Extraordinary Travel Festival 2022 which took place in Armenia.

28 world travelers, many of whom have already been to more than 100 countries, came to discover the observatory, which was granted the status of "National Value" of the Republic of Armenia in 2013.

Within the framework of the visit, the travelers met with the BAO director Areg Mickaelian. They had an opportunity to visit 1m Schmidt and the largest, 2.6m telescopes and reveal the interesting stories behind their installation, major works carried out with them and many more.

As a short note, Viktor Ambartsumian played a major role in both cases, as according to the order established in the USSR at that time, 2,6m telescope should not have been installed outside the RSFSR.



Extraordinary Travel Festival 2022 participants at 2,6m Telescope. BAO.



Extraordinary Travel Festival 2022 participants at 2,6m Telescope. BAO.

#### **October Anniversary Seminars**

October was a festive month in terms of the anniversaries of our famous astronomers in history. To pay tribute to those scientists, jubilee seminars were held at the Byurakan Astrophysical Observatory (BAO).

The occasions included Armenian astronomer Grigor Gurzadyan's 100<sup>th</sup> anniversary and French–Armenian astronomer Agop Terzan's 95<sup>th</sup> anniversary.

The speaker of the first jubilee seminar, was Vahagn Gurzadyan, Grigor Gurzadyan's son. He presented G. Gurzadyan's life and activities, unveiling the famous scientist from a different point of view.



Vahagn Gurzadyan. BAO.

More about Gurzadyan on page 8.

The seminar was followed by an exhibition of

the Armenian Philatelic Association, in which stamps and postcards about space astronautics were presented.

It should be noted, that on the occasion of Gurzadyan's 100<sup>th</sup> anniversary, BAO scientific council made a decision to name the 0.5m Schmidt telescope after Grigor Gurzadyan.



BAO Director Areg Mickaelian presenting Agop Terzan's life and activities

The second jubilee seminar was dedicated to Agop Terzan. The speaker was BAO Director Areg Mickaelian, who presented life and activities of the scientist. The stellar clusters revealed by Terzan and named after him are known to all astronomers. After the seminar, elder researchers shared their memories connected to Terzan and his visits to Armenia. *Learn about Terzan's life on page 10*.

#### **International Seminars at BAO**

October at the Byurakan Astrophysical Observatory (BAO) was full of international seminars.

On October 6, the BAO hosted a seminar by **Ilan Roth** from the University of California, Space Sciences (Berkeley, USA).

The report was dedicated to "Unusual enhancement of isotopes in Solar flares with implication to early and late evolution of stars". The speaker discussed the interesting analogy between observed electromagnetic waves at terrestrial aurora and inferred waves at solar



Ilan Roth. BAO.

corona which suggests an efficient selective acceleration of He3 isotopes and high charge states of Fe group. This long- standing problem is applied to an early sun with enhancement of Mg24 in a subset of meteorites and unusual observation in planetary nebulae.



Sergey Lisakov. BAO.

On October 13, there was the second international seminar of the month.

**Sergey Lisakov** from Lomonosov Moscow State University (Russia) presented seminar on "Corecollapse supernovae and their progenitors".

The speaker gave the overview of the history and their detailed study of the well observed object SN 2008bk. He mentioned that they are able to constrain its progenitor and explosion properties. Their modelling allows them to compare not only the basic properties such as luminosity, but also

to analyze in detail the spectral features, such as line identification and morphology. They show that a 12 M\_sun star on the main sequence is a good candidate for the progenitor of SN 2008bk. They also discuss the asymmetric shape of the H alpha line and conclude that it stems from the overlap with the strong Ba II 6496.9 Angstrom line.

Another seminar was presented by **Jill Tarter** from the SETI Institute (USA) on October 14. The seminar was devoted to the topic called "A Cosmic Perspective; Searching for Aliens, Finding Ourselves".

Here, the speaker addressed the question that humans have been asking throughout history: "are we alone?". According to her, since the middle of the twentieth century we have had new tools that permit us to embark on a scientific



Screenshot of the Online Seminar by Jill Tarter. 2022.

exploration to try to answer this old question. J. Tarter mentioned that we no longer have to ask the priests and philosophers what we should believe about extraterrestrial life; we can explore and discover what's actually out there, as the tools are getting ever better. The fact that we have discovered extremophiles in the most unexpected places on this planet and we have discovered that there really are far more planets than stars out there is fascinating. And according to the speaker, the 21st century will be the century in which we will find some answers.

#### Visit of foreign Armenian scientists to Armenia

In October, scientific advisors of the Byurakan Astrophysical Observatory, foreign Armenian astronomers Vladimir Airapetian, Tigran Arshakyan and Valery Hambaryan visited Armenia.

Despite the shortage of time, the scientists paid short visits to the BAO to meet with researchers.

Professor Vladimir Airapetian, Senior Astrophysicist at NASA Goddard Space Flight Center's Heliophysics Science Division and Research Professor at American University, DC was in Armenia in the frame of the Visiting Researcher Program. In the scope of that visit, Professor conducted lectures at the Yerevan State University. The topics included "The Search for Life in the Universe" and "Solving Puzzles of the Moon and Mars".

Such visits stimulate new collaborations and can contribute to the development of scientific potential.



Vladimir Airapetian. Armenia, 2022.

#### **ANNIVERSARIES**

#### Grigor Gurzadyan's 100th Anniversary

Grigor Gurzadyan (1922-2014) is one of the distinguished persons of Armenian astronomy whose courageous ideas and interesting scientific results always delighted the scientists. He was known as one of the founders of space astronomy. Gurzadyan's work is wide and extensive; besides astronomy he was known as a talented artist, as well as an author of numerous literary works.



Grigor Gurzadyan

Grigor Aram Gurzadyan was born on October 15, 1922 in Baghdad (Iraq) to a family of parents fled from Western Armenia in 1915. In 1944 he graduated from the Hydrotechnical and Constructional Departments of Yerevan Polytechnic Institute. The same year he became the post-graduate of academician Viktor Ambartsumian, and in 1948 at the age of 26 he defended his Candidate thesis on the topic "The Radiation Balance of Interstellar Gas Matter" in Moscow State University. In essence Gurzadyan was one of the main scientists of the founding team of the Byurakan Astrophysical Observatory. In 1955 (at the age of 33) he defended his Doctorate thesis. In 1950-1966 Gurzadyan was the Head of the Department of Physics of Stars and Nebulae of the Byurakan Observatory, in 1967-1973 he headed the branch of space researches, in 1973-1978 he headed Garni Astronomy

Laboratory, in 1978-1992 he was the Head of Extra-atmospheric Astronomy Laboratory of the Byurakan Observatory, in 1992-2004 he was the Head of Garni Space Astronomy Institute. Since 1979 he was the Head of the Chair of Space Instrument-Making of Yerevan Polytechnic Institute as well. For decades he lectured theoretical astrophysics at Yerevan State University and precise mechanics at Yerevan Polytechnic Institute, in 1962 he was awarded a professorship, in 1965 he was elected a corresponding member of Armenian SSR Academy of Sciences, in 1986 a full member.

Gurzadyan's works refer to the problems of radiation equilibrium of interstellar space, the morphological and kinematical investigations of stellar associations, diffuse and planetary nebulae, space instrument-making. He worked out the theory of formation of double-envelope nebulae, investigated the meaning of the magnetic field in formation of planetary nebulae forms, worked out a theory of star flares based on non-thermal phenomena occurring in them. Gurzadyan created a number of scientific devices and optical systems as well. The formation of automatic operation method, of the principle of optical system work of Orion Space Observatory is connected with his name. In 1990s he worked out the theories of common chromospheres (roundchromes) of close binary stars and of evolution of binary globular clusters.

As it was mentioned, Gurzadyan was among the founders of space astronomy. In 1960s using ballistic rockets R-5, he directed the UV and X-ray observations of the Sun and stars (the first launch was on February 15, 1961 from Kapustin-Yar base). His paper "A Powerful X-ray Flare on the Sun", published in communications of Armenian SSR Academy of Sciences in 1966 is among the earliest papers on space astronomy. Then Gurzadyan moved to design space orbital observatories; Orions were the most famous ones. In April, 1971 the first space station Salyut 1 carried Orion 1 onto the orbit, the first space telescope with an objective prism. But the highlight was Orion 2, which was operated onboard the spacecraft Soyuz 13 in December, 1973. Spectra of thousands of stars to 13th stellar magnitude, the first satellite UV spectrogram of a planetary nebula were obtained revealing spectral lines of aluminum and titanium – elements not previously observed in planetary nebulae, two-photon emission from nebula was directed for the first time. For comparison, the US Skylab's UV telescope, which was on the orbit at the same time, could only observe stars down to 7.5th magnitude. The obtained results were published in the most important astronomical journals, including 3 articles in the high-ranked journal "Nature".

Gurzadyan authored the most significant theoretical papers devoted to planetary nebulae, interstellar matter and flare stars. He published more than 200 scientific papers and a number of monographs: "Radioastrophysics" (1956, in Russian), "Planetary Nebulae" ("Nauka", 1962, in Russian and "Gordon and Breach", 1970, in English), "Flare Stars" ("Nauka", 1973, in Russian and "Pergamon", 1980, in English), "Stellar Chromospheres" ("Nauka", 1984, in Russian), "Physics and Dynamics of Planetary Nebulae" ("Nauka", 1988, in Russian and "Springer", 1997, in English), "Theory of Interplanetary Flights" ("Gordon and Breach", 1996, in English) and "Space Dynamics" ("Francis and Taylor", 2002, in English). Numerous paintings and literary works belong to Gurzadyan's creative heritage.

Grigor Gurzadyan was a member of the International Astronomical Union (1950) and an Honored Scientist of the Armenian SSR (1975). He was awarded the order "Sign of Honor". Grigor Gurzadyan passed away on February 22, 2014.

#### Agop Terzan's 95th Anniversary

Agop Terzan (1927-2020) was one of the most important people of Armenian Diaspora and French astronomy. The stellar clusters revealed by Terzan and named after him are known to all astronomers. With his perennial activity and essential results, he had a serious contribution in observational astrophysics.

Agop Terzan was born on October 31, 1927 in Constantinople (Istanbul). He graduated from the Constantinople University (he got his Bachelor degree on Mathematics in 1945 and Masters on Astronomy in 1949) and worked as a teacher of mathematics at Central



Agop Terzan

Lyceum of Istanbul. In 1956 he moved to France. In 1957-1959 Terzan worked as a teacher of mathematics at technical lyceum and in 1959-1965 as an assistant astronomer, later as a scientist. In 1967-1998 he worked at the Lyon Observatory, in 1982-1983 he was the Deputy Director of that observatory. In 1965 he was awarded a doctorate of mathematical sciences by Lyon University; in 1980 he was awarded a professorship.

Terzan's works mainly refer to variable stars, stellar clusters and problems of physics of stars. Since 1963 he made observations by a number of most significant telescopes of the world. He discovered 710 variable stars in the immediate vicinity of 14 globular clusters, 11 new globular clusters (named Terzan 1, etc. till Terzan 11), 158 diffuse nebulae, 124 galaxies (from which 25% appeared to be active galaxies of Sy2 type), 4430 red variable stars in direction to the Galactic center (including 458 ones which were later identified with the IRAS infrared sources), 1428 high proper motion stars ( $\mu > 0$ ".1 per year). 26 planetary nebulae, 122 diffuse galaxies in direction to the center of Our Galaxy. Later it was found out that those galaxies discovered by Terzan formed the cluster of galaxies of Ophiuchus constellation, as well as the super-cluster of Sagittarius-Ophiuchus, which was essentially discovered due to Terzan. On the basis of the observations recently made by European astronomers it was found out that Terzan 5 cluster was one of the main formations of the center of Our Galaxy; on its basis the Galaxy was formed. In essence it is the protogalaxy, which formed its central part (bulge) joining the Milky Way.

As a result of the above mentioned works Terzan published more than 100 scientific papers in the most important astronomical journals. Terzan also had a serious contribution in the working out of astronomical devices (devices and photometers for comparing eclipses), as well as in editorial and administrative works.

Terzan was a member of International Astronomical Union (1967), European Astronomical Society (1990) and French National Astronomy Committee (1964). In 1968-1978 he was the Head of Lyon Astronomical Society. He was awarded a Henry Rey prize of the French Astronomical Society (1977), prizes of French Ministry of Education (1979) and a number of medals. He was a Corona Prize winner of the French Academy of Sciences (1988).

Agop Terzan visited Armenia for many times, including his official missions to the Byurakan Astrophysical Observatory in 1971, 1973, 1977, 1984, 1989 and other years on purpose of participating in conferences and scientific discussions.

Agop Terzan passed away on April 4, 2020.

**ArAS News** is the electronic newsletter of the Armenian Astronomical Society. It was distributed to all ArAS members from the beginning of 2002, 4 times a year, typically at the end of each trimester. In 2009-2014, 8 issues annually and since 2015, 12 issues annually have been released.

ArASNews publishes information materials on ArAS, Byurakan Astrophysical Observatory and the Armenian astronomy in general, reports on ArAS Annual Meetings and participation of the Armenian astronomers in important international meetings, articles on occasion of anniversaries of famous Armenian astronomers and ArAS members, acceptance of new ArAS members, achievements of the Armenian astronomers, astronomical education in Armenia, Armenian archaeoastronomy, as well as science articles (reviews) on important studies.

So, if you want to share your studies with the scientific community, send us your articles to <u>melin.asryan@gmail.com</u>. They will be reviewed for the publication in ArAS Newsletters next issues.

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