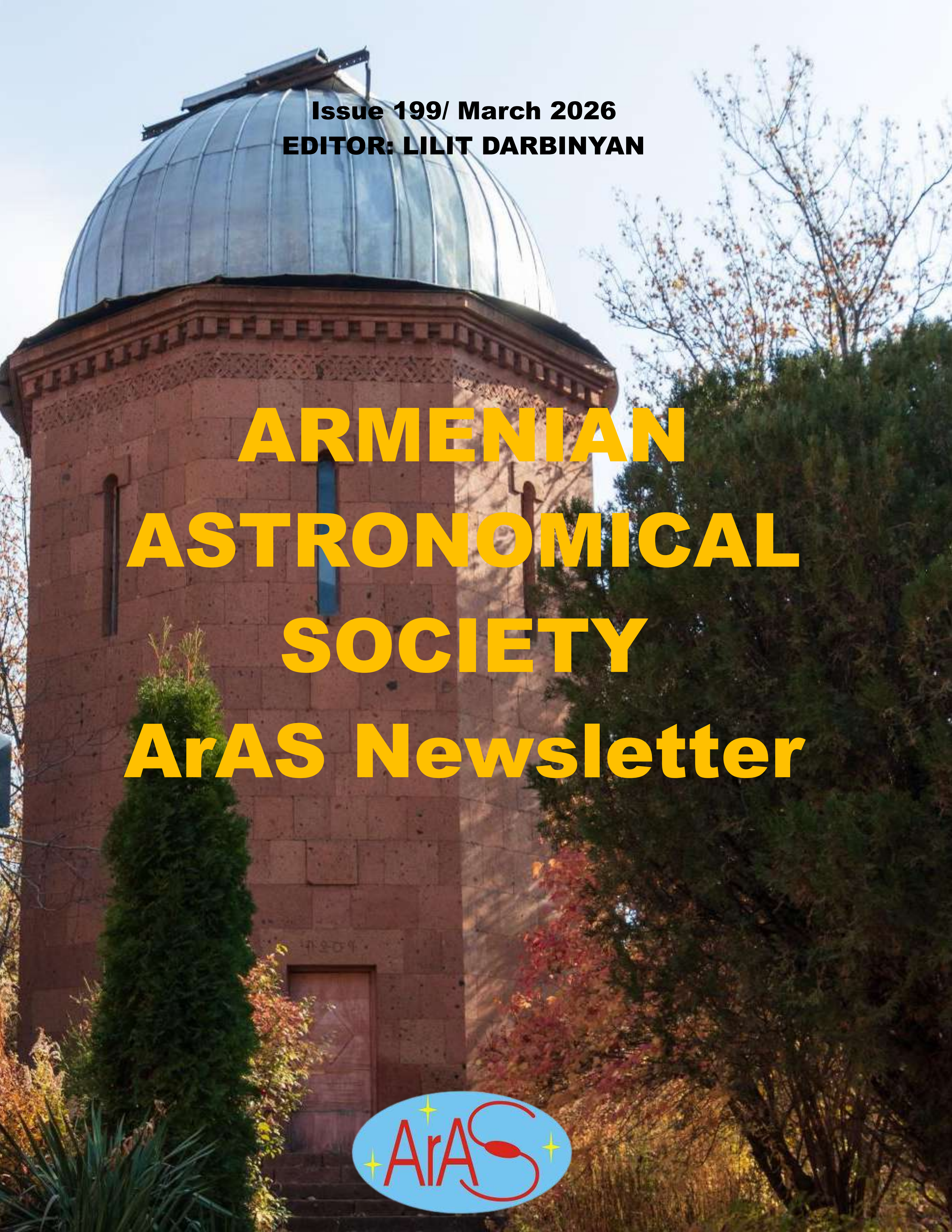

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ARMENIAN ASTRONOMICAL SOCIETY

ArAS Newsletter

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LOCAL NEWS

INNOVATIVE ASTRONOMY PROJECT BY SCHOOL STUDENTS

Recently, the Byurakan Astrophysical Observatory hosted 11th-grade students from the Gyumri Economic Lyceum.

As part of the visit, the project aims to highlight the contributions of Armenian scientists in English and make them accessible to an international audience. The project is being carried out within the framework of English language studies.

During the program, students create digital audio guides intended for use at the Viktor Hambardzumyan House-Museum. Some of the completed audio guides have already been digitized in English and converted into QR codes. By scanning them, visitors can learn about the history and activities of the Byurakan Astrophysical Observatory.

The project is led by Ohanna Avetisyan, co-author of the 11th-grade English textbook. The project materials are selected from the topics proposed in the textbook authored by their teacher.
During the visit, an agreement was also reached to continue and expand the program to other visitor sites of the Byurakan Astrophysical Observatory.

Within the framework of the project, students are also carrying out another astronomy-related task: they are exploring the possibility of life on other planets. The goal is to develop an educational game that demonstrates how a Mars rover could operate on the planet Mars.

BRINGING ASTRONOMY TO CLASSROOMS: NATIONWIDE LECTURE SERIES KICKS OFF IN 38 SCHOOLS

The Armenian Astronomical Society and the Byurakan Astrophysical Observatory have jointly selected 38 schools for their School Astronomy Lecture Program.

The lectures will be delivered throughout April by scientists from the Byurakan Astrophysical Observatory. The "From School to Space" lecture program includes the following schools:

YEREVAN
NPUA Basic High School (STEM)
Derenik Demirchyan No. 27 Basic School
Gevorg Chaush No. 188 Basic School
Alexander Pushkin No. 8 School
Hakob Kojoyan Educational Complex

ARAGATSOTN PROVINCE
Agarak T. Terlemezyan Secondary School
Aghdzk Secondary School
Ashtarak Gr. Ghapantsyan No. 4 Basic School
Bazmaghbyur N. Safaryan Secondary School
Voskehat Khrimian Hayrik Secondary School

ARMAVIR PROVINCE
Armavir R. Yeghoyan No. 1
High School Artimet
Secondary School Vagharshapat
"Nersisyan No. 6" Basic School

KOTAYK PROVINCE
Arzakan Kh. Khachatryan Secondary School
Zovuni R. Baghdasaryan Secondary School
Charentsavan Ye. Charents No. 5 Basic School

SHIRAK PROVINCE
Gyumri Academic Lyceum
Gyumri Economic Lyceum
Gyumri No. 10 Basic School
Gyumri No. 38 Basic School

LORI PROVINCE
Vanadzor A. Bakunts No. 7 Basic School
Vanadzor No. 8 Basic School
Stepanavan V. Tekeyan No. 6 Secondary School
Akhtala No. 2 Secondary School
Shnogh H. Meliksetyan Secondary School

TAVUSH PROVINCE
Ijevan High School
Ijevan No. 5 Basic School
Aygehovit Secondary School
Noyemberyan Lyceum
Sevkar Secondary School
Berdavan Secondary School
Bagratashen No. 1 Secondary School

GEGHARKUNIK PROVINCE
Areguni Secondary School
Lchavan A. Khachatryan School

ARARAT PRROVINCE
Khachpar Secondary School

VAYOTS DZOR PROVINCE
Areni Secondary School
Yeghegnadzor Lyceum

SYUNIK PROVINCE
Sisian No. 1 Basic School

INTERNATIONAL NEWS

INTERVIEW WITH PROF. BERNHARD BRANDL, LEIDEN UNIVERSITY, THE NETHERLANDS

⇒ Prof. Brandl, let's begin with your current work. Could you briefly tell us about your main research areas, and what particularly draws you to infrared astronomy and starburst galaxies?

Actually, I entered astronomy somewhat through the back door. During my university days I was a high-energy physicist, but I did not like the idea of working within very large research consortia. I was looking for something more practical, something that could be done in smaller groups.

Prof. Bernhard Brandl in Leiden University
Credits: Lilit Darbinyan

At that time there was an opportunity to pursue a PhD at the Max Planck Institute for Extraterrestrial Physics. The project involved building a near-infrared camera designed to work together with one of the first astronomical adaptive optics systems. In the late 1990s this system was deployed on the 3.6-meter telescope at the La Silla Observatory in Chile.

I really enjoyed the process of building an instrument and then using it on the sky to make discoveries. That experience shaped my scientific path—learning by doing. The instrument itself essentially determined the scientific direction: it was designed for the near-infrared, which was where adaptive optics worked best at the time. That is how I became involved in astronomical instrumentation, while in parallel I was learning astronomy itself.

Later I received an interesting job offer to move to Cornell University. That was also where I first came into contact with Armenian astronomers. At the time Yervant Terzian was the chair of the department, and Areg Mickaelian was visiting Cornell. After some work on instrumentation, I had the opportunity to work with data from the **Spitzer Space Telescope**, one of NASA's Great Observatories operating in the infrared.

Spitzer was ideally suited for studying starburst galaxies. There I could combine my earlier work on high-angular resolution observations of massive star clusters with integrated spectra of starburst complexes. That became the central theme of my scientific work: instrumentation combined with studies of the infrared universe.

Later I moved to Leiden and worked on the spectrograph for the **James Webb Space Telescope**. And today I am the Principal Investigator of the **METIS instrument**, the thermal mid-infrared instrument for the **Extremely Large Telescope (ELT).** Throughout my career I have alternated between ground-based and space-based instrumentation, but instrumentation has always been the central theme.

⇒ You are leading the METIS project for the European Extremely Large Telescope (ELT). What makes METIS unique, and how will it contribute to the next generation of astronomical discoveries?

Prof. Bernhard Brandl in Leiden University
Credits: Lilit Darbinyan

The Extremely Large Telescope represents a huge leap forward—from today's 8–10 meter telescopes to a telescope with a primary mirror of about 40 meters. This means the angular resolution will improve by roughly a factor of five.

Such an improvement is particularly important for observations that require very high angular resolution or very high contrast. A prime example is the search for exoplanets. In protoplanetary disks, for instance, we need to study very small angular separations from the central star—regions that are currently extremely difficult to observe.

Another key advantage is the enormous collecting area. In the mid-infrared we are often limited by thermal background radiation, which produces significant photon noise. A much larger telescope aperture increases the signal-to-noise ratio, allowing us to detect objects that were previously beyond reach.

METIS will be one of the first instruments installed on the ELT. It operates at longer wavelengths and is optimized for studying dusty, warm, or cool environments—objects that are not the hottest in the universe but are rich in infrared emission. Key science drivers include **exoplanets and protoplanetary disks**.

The instrument includes a relatively small field of view but very advanced spectroscopic capabilities. In particular, it features an integral-field spectrograph with extremely high spectral resolution—around **R ≈ 100,000**. At the same time, it will achieve angular resolutions on the order of **20 milliarcseconds**.

To put that into perspective: typical atmospheric seeing at a good observatory site might be around one arcsecond. METIS will provide roughly **50 times better angular resolution**. Combined with the high spectral resolution, this will allow detailed studies of kinematics and chemical composition in environments such as protoplanetary disks. These capabilities make METIS a truly unique instrument.

⇒ You are also one of the co-principal investigators of the MIRI instrument onboard the James Webb Space Telescope. Could you share any exciting updates from MIRI's recent observations?

In very simple terms, the most remarkable result is that everything works so well. The telescope and its instruments are producing an extraordinary amount of high-quality data. Considering how complex the mission is, the fact that it operates so efficiently and without major problems is already a major success.

Of course, this success reflects the work of thousands of scientists and engineers who contributed to the mission over many years. It also explains why the project required such a significant investment.

It is difficult to single out one specific scientific discovery. Modern astronomy often advances through the accumulation of evidence rather than a single dramatic observation. Nevertheless, one particularly exciting area is the study of the **early universe**.

For the first time we are able to observe very young galaxies and resolve their spatial structure. This allows astronomers to compare observations directly with theoretical models of early galaxy formation. Some of the results have been surprising and are helping refine our understanding of how galaxies formed shortly after the Big Bang.

There is a great deal of exciting science emerging from these observations, and undoubtedly much more to come.

⇒ **Being involved in both ground-based and Space instrumentation, how do you see the balance between these platforms evolving in the coming decade?**

Many of the technologies involved are actually very similar. Whether in Space or on the ground, we build instruments with similar materials, optics, and opto-mechanical systems.

However, ground-based instruments allow more flexibility. You can adopt newer technologies and take greater risks. If something fails, it can often be repaired or replaced. For example, ground-based instruments can use the very latest detector technologies.

Space missions, on the other hand, must use extremely reliable and thoroughly tested technology. Instruments must pass many qualification procedures and demonstrate that they can survive the harsh conditions of space, including radiation. This means the technology used in Space missions is often several years older by the time the instrument is launched.

Ground-based observations also face practical limitations such as weather and atmospheric turbulence. Adaptive optics helps correct for atmospheric distortion, but it is not a perfect solution and works only under certain conditions.

Space telescopes offer incredibly stable observing conditions with very low background noise. This allows astronomers to integrate observations for many hours and detect extremely faint objects, something that is very difficult from the ground.

However, Space missions are extremely expensive and cannot easily be repaired once deployed. In the past, the Hubble Space Telescope could be serviced because it was in Earth orbit, but modern missions like the James Webb Space Telescope are far beyond that reach.

In short, both platforms are essential and complementary. Ground-based telescopes allow flexibility and technological innovation, while Space telescopes provide stability and access to wavelengths that are difficult or impossible to observe from Earth.

⇒ You are also a member of the [Armenian Astronomical Society (ArAS).](#) How did your connection with Armenia and its astronomical community begin?

Prof. Bernhard Brandl in Leiden University Academy Building
Credits: Lilit Darbinyan

It started through a fortunate coincidence when I was a postdoctoral researcher at Cornell University. Areg Mickaelian came to visit Cornell, where he had connections with the Department.

At that time I was working on starburst galaxies and infrared spectroscopy, and there was clear scientific overlap with the **First Byurakan Survey**, which identified many emission-line galaxies.

We had many discussions with colleagues such as Dan Weedman and Jim Houck. The approaches were quite complementary. The Byurakan surveys provided large datasets and catalogs containing many interesting objects, while our work often focused on detailed observations of individual targets using large telescopes.

Through the **Spitzer Guaranteed Time Observing program**, we were able to observe some of the galaxies identified in those catalogs.
That collaboration began in the early 2000s.

Since then we have remained in contact, exchanging ideas and visits. I also find it personally interesting to see what is happening in Armenia. There are many enthusiastic young astronomers there, and it also reminds us how fortunate we are in Central Europe, where access to large observing facilities is relatively straightforward. Not everyone has that privilege.

⇒ Based on your experience, where do you see potential for cooperation between METIS-related research and BAO?

Astronomy as a field is currently going through a period of transition. For a long time we had a relatively stable situation with 8-meter-class telescopes as the largest facilities. Now we are building 30- and 40-meter telescopes and planning new large space missions.

At the same time, many smaller observatories with telescopes in the 2–4 meter range continue to produce excellent science. No one wants to abandon these facilities, but funding is always limited.

The global community is therefore rethinking how to best use telescopes of different sizes. Large telescopes are essential for the most challenging observations, but smaller telescopes remain extremely important for follow-up observations, surveys, and student training.

In fact, we cannot train students exclusively on the largest telescopes. Students also need hands-on experience with observations and instrumentation.

For collaboration with BAO, one promising direction would be **instrumentation development**. Building unique instruments at medium-sized observatories could provide valuable opportunities for students and enable follow-up observations for large international projects.

Exactly what form this collaboration might take is something that would require further discussion.

⇒ **What advice would you give to students and early-career researchers in Armenia who want to enter fields such as infrared instrumentation or Space missions?**

First of all, working in astronomy is a privilege. It allows you to pursue your curiosity about the Universe.

However, the field has become increasingly competitive. Finding a permanent position is more difficult today than it was twenty or thirty years ago. Because of that, it is important to be driven by genuine curiosity and passion for the subject.

At the same time, astronomy is evolving. Many modern projects involve large surveys that produce enormous volumes of data—terabytes every night. No one can examine this data manually anymore. Instead, we rely on advanced data analysis techniques, including artificial intelligence.

For young scientists, it is therefore important not only to understand astronomy but also to develop skills in programming, data analysis, and machine learning.

Another important change is that data are becoming more accessible. A hundred years ago you had to be physically present at an observatory to access observations. Today many datasets from large surveys are publicly available worldwide.

This means that students in Armenia can work with the same data as students at major research institutions. With the right tools and ideas, they can make significant discoveries even without direct access to large observatories.

Interview conducted by ***Lilit Darbinyan***
Press Secretary of Byurakan Astrophysical Observatory (BAO)
Newsletter Editor of Armenian Astronomical Society (ArAS)

INTERVIEW WITH PROF. PEDRO RUSSO, LEIDEN UNIVERSITY, THE NETHERLANDS

⇒ Could you share what initially inspired your journey into astronomy, and how you came to specialize in the intersection of astronomy, communication, and society?

That's a very broad question. I've been working in the field of astronomy communication for more than 30 years, so it's a long story. In fact, my interest started almost as soon as I began my university career—and even before that.

I grew up in a very rural environment, in the countryside, with beautiful dark skies. I spent a lot of time simply looking at the stars. When I was about 11 or 12 years old, I saw a shooting star—a meteor—and I became extremely curious. I wanted to understand what it was, so I began looking for information. I discovered astronomy books in the public library and started developing a deeper interest in astronomy.

Later, when I began studying astronomy at university, together with some colleagues we created a student group focused on astronomy outreach. We started organizing small activities related to astronomy communication.

Prof. Pedro Russo
Credits: NAMES 2024

Through this experience, I became very interested in outreach and education, and that's how my career in astronomy communication and astronomy education began.

My main interest lies in the connection between astronomy and society—the many ways astronomy interacts with people beyond the scientific community

⇒ You led the largest science outreach campaign ever—the International Year of Astronomy 2009. Looking back, what were the key lessons from coordinating such a vast global network, and what do you consider its most lasting legacy?

Yes, I was the global coordinator of the International Year of Astronomy 2009. It was an initiative of the International Astronomical Union, carried out in collaboration with UNESCO and endorsed by the United Nations. It was certainly one of the largest projects I have ever been involved in.

One of the key lessons we learned was the importance of balancing global coordination with local initiative. The project worked because it provided an open platform—anyone could participate, and people from all over the world could organize their own activities and join the celebration.

At the same time, we also created what we called "cornerstone projects," which provided a common framework and vision. These included initiatives such as teacher training programs, Astronomy and World Heritage, and Astronomy for Development. They connected activities worldwide while allowing local communities to adapt them to their own contexts.

The long-lasting legacy of the International Year of Astronomy is that much of the global infrastructure we have today in astronomy education, public engagement, and development actually began during that year. For example, the network of National Outreach Coordinators (NOCs) and many teacher-training initiatives were launched at that time. Programs such as the Galileo Teacher Training Program and networks of astronomy education coordinators also emerged from those efforts.

Many of these initiatives are still active today. In fact, in Armenia, several of the programs developed at the Byurakan Astrophysical Observatory related to astronomy and society trace their origins back to that period. Seeing this legacy continue more than a decade later is something that makes me very proud.

⇒ **You currently coordinate the Astronomy & Society group at Leiden Observatory. What are the current priorities or flagship projects of the group?**

About three years ago, we revised our strategy. For many years we focused mainly on practical implementation of astronomy education and outreach programs.

Prof. Pedro Russo
Credits: Leiden University

One example is the Universe Awareness program, which aimed to introduce young children to astronomy and use it as a tool for science education and global citizenship education. We were also deeply involved in developing exhibitions and public programs for the Old Observatory in Leiden.

However, after the pandemic we decided to shift our focus toward two main directions.

First, we are now conducting more research on how astronomy is used outside academia. This includes studying astronomy education, communication, and public engagement to better understand what works, what doesn't, and why. In a way, we are developing a more research-oriented approach to astronomy communication.

Second, we focus on supporting international networks related to astronomy. For example, we host the European Regional Office of Astronomy for Development, working closely with our sister office in Armenia. Through this network, we help identify ways to support the astronomy community and strengthen its social impact.

We also collaborate closely with the International Astronomical Union. One member of my team works specifically on fundraising for the IAU, helping to support initiatives related to education, public engagement, and development. In addition to this work, I also teach courses at Leiden University related to astronomy communication.

⇒ How do you see the role of science communicators evolving in the era of digital platforms and misinformation?

That is a very complex question. One thing I believe scientists—and especially astronomers who enjoy communication—should do is simply be present.

I say this while acknowledging that I myself am mostly active only on LinkedIn. I'm not very active on other social media platforms. But I do think it is important for scientists to be present online, creating content and sharing knowledge about astronomy and science in general.

It is important that this content is accurate and scientifically sound, but also engaging and emotionally meaningful for people. Unfortunately, research shows that misinformation and mistrust in science are very complex issues. They cannot be solved simply by providing more information or education. However, people need reliable content if they are to trust science. So scientists should communicate more actively and participate in digital platforms where conversations about science are happening.

⇒ As a professional in science communication, what recommendations would you give to institutions like the Byurakan Astrophysical Observatory to strengthen their position in the global science communication ecosystem?

This is a multilayered question, because institutions can contribute through education, public engagement, and development. In fact, Byurakan Astrophysical Observatory is already a very good example of how an institution can successfully invest in these areas, particularly in topics related to astronomy and society.

My first recommendation is not to be afraid to invest resources in outreach and communication. Many scientific institutions feel underfunded, and often the first areas where budgets are reduced are education and public engagement. In my view, this is a mistake. In the long term, these investments strengthen public support and political support for science.

Research suggests that if an organization invests around five to ten percent of its budget in public engagement, the results can be very significant.

Second, institutions should develop clear strategies for communication. Decide what your priorities are: public events, media engagement, social media, educational programs, or a combination of these. Research shows that strategic planning significantly increases impact.

Third, institutions should encourage their scientists to communicate. The public wants to hear directly from scientists, not only from professional communicators. Creating incentives and support for scientists to share their work with the public is therefore very important.

Finally, institutions that wish to have greater international impact should communicate in English as well as in their local language. This allows their work and initiatives to reach broader global audiences.

And of course, participating in international conferences and networks is essential. Presenting your work, sharing experiences, and bringing international initiatives to your country are all ways to strengthen your presence in the global science communication community.

Interview conducted by Lilit Darbinyan
Press Secretary of Byurakan Astrophysical Observatory (BAO)
Newsletter Editor of Armenian Astronomical Society (ArAS)

RECENT PUBLICATIONS OF THE BYURAKAN ASTROPHYSICAL OBSERVATORY'S ASTRONOMERS

No.	Authors	Title	Publication
1.	Ter-Kazarian, G.	On Two More Consequences of the Theory of Master Space-Teleparallel Supergravity	**Gravitation and Cosmology**

ArAS News is the electronic newsletter of the Armenian Astronomical Society, distributed to all ArAS members since the beginning of 2002.

The newsletter features informational materials on ArAS, the Byurakan Astrophysical Observatory, and Armenian astronomy in general. It includes reports on ArAS Annual Meetings, the participation of Armenian astronomers in major international meetings, and articles dedicated to the anniversaries of prominent Armenian astronomers and ArAS members.

In addition, ArAS News covers the admission of new ArAS members, the achievements of Armenian astronomers, developments in astronomical education in Armenia, Armenian archaeoastronomy, and scientific review articles on significant studies.

Researchers who wish to share their work with the scientific community are invited to submit their articles to lilit.darbinyan7@gmail.com.
All submissions will be considered and reviewed for possible publication in upcoming issues of ArAS News.
Issues of the ArAS Newsletter are available online at the following link.