

ArAS News

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ARMENIAN ASTRONOMICAL SOCIETY (A r A S)



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Editor: Sona FARMANYAN

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ASTRONOMICAL SURVEYS AND BIG DATA



International Symposium, dedicated to
50th anniversary of Markarian Survey and 10th anniversary of Armenian Virtual Observatory
5-9 October 2015, Byurakan, Armenia

FIRST ANNOUNCEMENT

SCIENTIFIC RATIONALE

Astronomical surveys are the main source for discovery of astronomical objects and accumulation of observational data for further analysis, interpretation, and achieving scientific results. In 1940s-1950s Palomar Observatory Sky Survey (POSS, at present digitized as DSS1) gave more data than it was collected during the whole epoch of astronomical observations before. Similarly, Markarian Survey (or the First Byurakan Survey, FBS) was the first large-area spectroscopic survey resulting at low-dispersion spectra of 20,000,000 objects. Later on, many all-sky or large-area surveys appeared (POSS2 (DSS2), SDSS, etc.). Sloan Digital Sky Survey (SDSS) so far has provided the largest database (both photometric and spectroscopic) and SDSS-based virtual sky may be explored for new discoveries. CALIFA gives a new large set of spectra. Gaia and LSST are the next source for vast amount of information. Modern multiwavelength surveys include GOODS, COSMOS, GAMA, and others. The large amount of data requires new approaches to data reduction, management and analysis. We now deal with Big Data. Powerful computer technologies are required, including clusters and grids. Virtual Observatories (VOs) have been created to coordinate astronomers' and computer scientists' actions and help in accomplishment of complex research programs using all the accumulated data. International Virtual Observatory Alliance (IVOA) unifies 20 VO projects for joint efforts toward handling of Big Data and creation of an environment for more efficient research. The International Council of Scientific Unions (ICSU) has recently created World Data System (WDS) to unify data coming from different science fields for further possibility of exchange and new science projects.

A meeting “*Astronomical Surveys and Big Data*” dedicated to 50th anniversary of Markarian Survey and 10th anniversary of the Armenian Virtual Observatory (ArVO) will be held on Oct 5-9, 2015 in Byurakan, Armenia. We intend to combine astronomers and computer scientists with heavy involvement of astronomical surveys, catalogs, archives, databases and VOs.

Our meeting will contribute to the following:

- Review and discuss large astronomical surveys to summarize observational data obtained in astronomy
- Give tribute to Markarian Survey and other important surveys
- Review and discuss astronomical catalogues, databases and archives
- Learn about major upcoming surveys (including PanSTARRS, Gaia, and LSST)
- Learn and discuss how large observational data sets are changing astronomy
- Introduce tools and techniques for working with large data sets (including access, analysis, and visualization)
- Discuss the future of astronomical research by joint efforts of astronomers and computer scientists

The Symposium is dedicated to Markarian Survey 50th anniversary. Benyamin Markarian (1913-1985, <http://markarian.aras.am/>) was the first to conduct and accomplish a large-area (17,000 sq. deg.) spectroscopic survey in 1965 to search for active galaxies. Markarian survey is until now the largest objective-prism spectroscopic survey, it was the first systematic search for active galaxies using a new method of UV-excess, it resulted in the discovery of 1515 UVX galaxies (Markarian galaxies), including many AGN and Starbursts, first classification of Seyferts into Sy1 and Sy2, and definition of Starburst galaxies. BAO is famous for other surveys as well: Arakelian and Kazarian galaxies, Shahbazian compact groups, Parsamian cometary nebulae and other objects also are well known. Byurakan is a right place for organization of such meeting.

A number of important astronomical meetings have been organized in Armenia, mostly in the Byurakan Astrophysical Observatory (BAO) (<http://aras.am/BAO/meetings.html>): IAU Symposia: #29 in 1966 (Non-Stable Phenomena in Galaxies), #121 in 1986 (Observational Evidence of Activity in Galaxies), #137 in 1989 (Flare Stars in Star Clusters, Associations and Solar Vicinity), #194 in 1998 (Activity in Galaxies and Related Phenomena) and #304 in 2013 (Multiwavelength AGN Surveys and Studies), IAU Colloquium #184 in 2001 (AGN Surveys), as well as the all-European JENAM meeting in 2007. Moreover, the Byurakan International Summer Schools (BISS) are being organized since 2006, and four successful schools have been held in 2006, 2008, 2010 (combined with the 32th IAU ISYA), and 2012.

BYURAKAN SURVEYS

Markarian Survey (or the First Byurakan Survey, FBS) was the first systematic objective prism survey in the world and the first survey for active galaxies. 1500 UV-excess galaxies were discovered, later named Markarian galaxies. Its digitized version, DFBS, was created in 2002-2005 and the Armenian Virtual Observatory (ArVO) was founded in 2005 as well. Byurakan Astrophysical Observatory (BAO) always has been famous with its surveys and discovery of new objects, such as Markarian, Arakelian and Kazarian galaxies, Shahbazian groups, Parsamian nebulae, etc.

More information on Byurakan surveys may be found at: <http://www.aras.am/Dfbs/dfbs.html> and <http://markarian.aras.am/bsmick.html>

TOPICS

- Historical surveys; Byurakan surveys for active galaxies (Markarian, Arakelian, Kazarian) and others
- Surveys for exoplanets
- Surveys for stars and nebulae
- Extragalactic and cosmological surveys
- Cross-identifications between surveys and discovery of new objects
- Future large-area surveys
- Digitization of astronomical data
- Astronomical catalogues, archives and databases
- Computational astrophysics and virtual observatories

ORGANIZERS and SPONSORS

Ministry of Education and Science State Committee of Science (MES SCS)
National Academy of Sciences of the Republic of Armenia (NAS RA)
Byurakan Astrophysical Observatory (BAO)
Armenian Virtual Observatory (ArVO)

SCIENTIFIC ORGANIZING COMMITTEE (SOC)

Christophe Arviset (ESA, Spain)
 Hrachya Astsatryan (IIAP, Armenia), Co-Chair
 Kamo Gigoyan (BAO, Armenia)
 Ajit Kembhavi (VO-India, India) (TBC)
 Andrew Lawrence (AstroGrid, UK)
 Tigran Magakian (BAO, Armenia)
 Norair Melikian (Armenia)
 Areg Mickaelian (BAO/ArVO, Armenia), Co-Chair
 Elena Nikoghosyan (BAO, Armenia)
 Ray Norris (Australia) (TBC)
 David Schade (Canada)
 Joachim Wambsganss (GAVO, Germany)

LOCAL ORGANIZING COMMITTEE (LOC)

Co-Chairs: Haik Harutyunian and Areg Mickaelian
 Secretary: Elena Nikoghosyan
 LOC members: Hayk Abrahamyan, Misha Aleksanyan, Naira Azatyan, Sona Farmanyan, Knarik Khachatryan, Hasmik Melkumyan, Gor Mikayelyan, Gabriel Ohanian, Gurgen Paronyan, Ani Vardanyan, Manush Zohrabyan

INVITED SPEAKERS (*tentative list*)**EXOPLANETS**

Joachim Wambsganss (Germany) “*Discovering extrasolar planets with gravitational microlensing surveys*”
 Garik Israelian (Spain) “”
 Alain Sarkissian (France) “*Data bases in planetary space research: the International Planetary Data Alliance, IPDA*”

STARS and NEBULAE

Dirk Froebrich (UK) “*Narrow Band Surveys of the Galactic Plane*”
 Tigran Magakian (Armenia) “*Search for young stars and stellar objects*”
 Oleg Malkov (Russia) “*The Binary star database BDB: current status and scientific tasks*” (TBC)
 Tigran Movsessian (Armenia) “”
 Norair Melikian (Armenia) “”
 Elena Nikoghosyan (Armenia) “”
 Kamo Gigoyan (Armenia) “*Search and studies of carbon stars at high Galactic latitudes*”
 Chris J. Davis (UK) “” (TBC)

GALAXIES and COSMOLOGY

Ajit Kembhavi (India) “*Astronomy with large galaxy databases*”
 Johan Knapen (Spain) “*Galaxy Surveys in the next Decade*”
 Areg Mickaelian (Armenia) “*Search and studies of active galaxies at BAO*”
 Jesus Falcon-Barroso (Spain) “*Understanding the nearby Universe through the CALIFA survey*”
 Simon Driver (Australia) “*The evolution of galaxy redshift surveys and the rise of panchromatic astronomy*”
 Ray Norris (Australia) “*EMU: increasing our knowledge of the radio sky by a factor of 30*”
 David Schade (Canada) “”
 Andrew Lawrence (UK) “*Clues to the structure of AGN through massive variability surveys*”

DATABASES and VOs

Areg Mickaelian (Armenia) “*Astronomical Surveys, Catalogs, Databases and Archives*”

Hrachya Astsatryan (Armenia) “”

Christophe Arviset (Spain) “*The Gaia Archive: VO in action in the big data era*”

Fabio Pasian (Italy) “” (TBC)

Areg Mickaelian (Armenia) “*BAO plate archive digitization project and its scientific usage*”

ABSTRACT SUBMISSION

Abstract submission is open from 15 March till 30 June 2015 through our webpage. The typical size of abstracts is 250 words or 1500 characters. Contributed papers and posters will be selected by SOC and the contributors will be notified before 31 July 2015. Final modifications are allowed till 10 August.

REGISTRATION

The early registration is open from 15 March till 30 June 2015. The participants will be selected based on submitted abstracts and notified before 31 July 2015. There will be invited (30-40 min) and contributed (15-20 min) talks. Poster presentations are also welcome during the Posters session on 09.10.2015 (3-5 min). The final programme will be available on 15.08.2015.

PROCEEDINGS

The Proceedings will be published by BAO. Areg Mickaelian and Tigran Magakian are the editors. Deadline for submission of papers is 31 December 2015. Instructions for preparation of the papers will be given later.

<i>Page limits:</i>	Invited talks	8 pages
	Contributed talks	5 pages
	Posters	2 pages

DATES and DEADLINES

15.03.2015	First announcement and webpage; call for abstracts and registration
30.06.2015	Abstract submission and registration deadline
31.07.2015	Accepting abstracts and selection of participants
15.08.2015	Final programme and list of participants. Abstracts available online
15.08.2015	Accommodation reservation deadline
01.09.2015	Final announcement with practical information
05-09.10.2015	“ <i>Astronomical Surveys and Big Data</i> ” symposium
31.12.2015	Submission of papers for the Proceedings deadline
31.05.2016	Publication of the Proceedings Book

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ARMENIAN-IRANIAN ASTRONOMICAL WORKSHOP



FIRST ANNOUNCEMENT

RATIONALE

Armenia and Iran are among the most ancient countries in the world and have lived as neighbours through thousands years of history. Armenian and Iranian culture has many similarities and relations. During the recent years, tight relations are being established in more and more spheres, including politics, economy, tourism, sports, culture and indeed science. This Workshop is to strengthen our scientific relations and establish new collaboration. We plan to organize such workshops on annual basis, succeeding each other one in Armenia and one in Iran.

Aims and scope. We will establish mutual contacts, discuss and conduct joint research projects, give start to Armenian-Iranian astronomical collaboration, which will include several forms of relations:

- organization and participation in regional activities;
- collaborative research grants between Armenian and Iranian scientific groups;
- stays of Armenian scientists at Iranian institutions for joint research work;
- stays of Iranian scientists at Armenian institutions for joint research work;
- stays of young Armenian scientists for training and fulfillment of Ph.D. theses;
- stays of young Iranian scientists for training and fulfillment of Ph.D. theses;
- organization of joint meetings in frame of the collaboration;
- Byurakan International Summer Schools (BISS) with invitation of Iranian students;
- observations on joint projects with the Byurakan 2.6m telescope;
- collaboration between the Armenian and Iranian Virtual Observatories;
- joint archaeoastronomical and cultural studies.

Such joint workshops have been organized with Georgian colleagues since 1974 and proved to be rather useful. We also have organized two joint Armenian-French workshops in 1995 and 2009, as well as several others, including with Russian colleagues from Saint Petersburg and Moscow.

Previous relations. Alenush Terian (1920-2011), is considered as the “Mother of Iranian astronomy”. *Prof. Vahe Petrosian*, famous astrophysicist at Stanford University has Armenian origin and was born in Iran. In 1990s-2000s several contacts were conducted during the visits of Armenian astronomers G.T. Ter-Kazarian, E.Ye. Khachikian and A.G. Nikoghossian. Gagik Ter-Kazarian was awarded the prestigious Al-Kharazmi Prize. Shant Baghrmian is an Iranian-Armenian astrophysicist, who visited Armenia for a meeting in 2008 and worked with *Prof. Aram Saharian* (Yerevan State University, Armenia). Six Iranian students participated at *Byurakan International Summer Schools* in 2010 and 2012 (BISS, Programme Director: Areg Mickaelian).

During the last BISS, Habib Khosroshahi and Areg Mickaelian remotely signed a Memorandum of Understanding for further collaboration. In January 2015, the Acting President of the Armenian Astronomical Society (ArAS) Areg Mickaelian participated in the Workshop “*Galaxies; inside and out*” as an invited speaker and discussed the possible Armenian-Iranian collaboration with the Acting President of the Astronomical Society of Iran (ASI) Habib Khosroshahi. The idea for organizing joint meetings was regarded as highly reliable.

TOPICS

For the first meeting, we keep topics open and contributions on any astronomy/astrophysics topic are welcome.

- Armenian and Iranian astronomy
- Solar System exploration
- Stars and Nebulae
- Galaxies and Cosmology
- Astronomical Surveys and Databases
- Theoretical Astronomy and Astrophysics
- Laboratory Astrophysics and Virtual Observatory
- Archaeoastronomy and Astronomy in Culture
- Astronomical Education

ORGANIZERS and SPONSORS

NAS RA V. Ambartsumian Byurakan Astrophysical Observatory (BAO)

Armenian Astronomical Society (ArAS)

Astronomical Society of Iran (ASI)

Institute for Research in Fundamental Sciences (IPM)

SCIENTIFIC ORGANIZING COMMITTEE (SOC)

Ali Adjabshirizadeh (RIAAM, Iran)

Haik Harutyunian (BAO, Armenia)

Habib Khosroshahi (IPM, Iran, Co-Chair)

Tigran Magakian (BAO, Armenia)

Areg Mickaelian (BAO, Armenia, Co-Chair)

Sadollah Nasiri (SBU, Iran)

Arthur Nikoghossian (BAO, Armenia)

Elena Nikoghosyan (BAO, Armenia)

Elma Parsamian (BAO, Armenia)

Artashes Petrosian (BAO, Armenia)

Sohrab Rahvar (SUT, Iran)

Aram Saharian (YSU, Armenia)

Yousef Sobouti (IASBS, Iran)

LOCAL ORGANIZING COMMITTEE (LOC)

Co-Chairs: Haik Harutyunian (BAO Director) and Areg Mickaelian (ArAS Acting President)

Secretary: Elena Nikoghosyan (BAO Scientific Secretary)

LOC members: Hayk Abrahamyan, Misha Aleksanyan, Naira Azatyan, Sona Farmanyany,

Knarik Khachatryan, Hasmik Melkumyan, Gor Mikayelyan, Gabriel Ohanian, Gurgen Paronyan, Ani Vardanyan, Manush Zohrabyan

INVITED SPEAKERS (*tentative list*)

Ali Adjabshirizadeh – *Astronomical research in RIAAM*
 Haik Harutyunian – *Viktor Ambartsumian and Byurakan Astrophysical Observatory (BAO)*
 Habib Khosroshahi – *Iranian National Observatory (INO)*
 Reza Mansouri – *Scientific development in Iran and key science projects*
 Areg Mickaelian – *Armenian Astronomical Society (ArAS) activities; BAO Plate Archive and Armenian Virtual Observatory (ArVO)*
 Sadollah Nasiri – *Site selection for the Iranian National Observatory*
 Elma Parsamian – *Armenian archaeoastronomy*
 Aram Saharian – *Quantum Effects in Cosmology*

REGISTRATION and ABSTRACT SUBMISSION

The registration is open from 1 March till **30 June 2015**. The participants will be selected by ArAS and ASI on the basis of submitted abstracts and notified before 31 July 2015. Iranian authors of oral presentations (15 participants) will be invited to the Workshop and Iranian authors of posters are invited to submit their posters as well. There is no registration fee. All local expenses, including the accommodation, meals and local transportation are covered by the Armenian part.

Abstract submission is open from 1 March till **30 June 2015** through our webpage. The typical size of abstracts is 250 words or 1500 characters. Contributed papers and posters will be selected by SOC and the contributors will be notified before 31 July 2015. Final modifications are allowed till 10 August.

For registration and abstract submission please follow this link: <http://armenia-iran-1.aras.am/registration.html>

There will be invited (30-40 min) and contributed (20 min) talks. Poster presentations are also welcome during the Posters session on 16.10.2015 (3-5 min). The final programme will be available on 15.08.2015.

PROCEEDINGS

The Proceedings will be published by BAO. Haik Harutyunian, Habib Khosroshahi and Areg Mickaelian are the editors. Deadline for submission of papers is 31 December 2015. Instructions for preparation of the papers will be given later.

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15.08.2015	Final programme and list of participants. Abstracts available online
01.09.2015	Final announcement with practical information
13-16.10.2015	Armenian-Iranian Astronomical Workshop
31.12.2015	Submission of papers for the Proceedings deadline
31.03.2016	Publication of the Proceedings Book

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BAO PARTICIPATION AT YOUNG SCIENTISTS SUPPORT PROGRAM EXHIBITION-REPORT



RA President Serzh Sargsyan held a meeting with young scientists at the National Academy of Sciences of RA. The persons in charge of the Young Scientists Support Program (YSSP) introduced the Armenian President the results achieved during the period from July 2013 to February 2015, as well as to the current works and the upcoming programs.

The report included the seven main directions of the YSSP – provision of financial assistance for young scientists' international scientific missions, provision of financial assistance for young scientists to organize symposiums, schools, seminars, provision of research grants, provision of financial assistance for young scientists to publish their books, provision of financial assistance for young scientists to acquire research devices and materials, provision of financial assistance for young scientists to publish their research articles in highly influential periodicals and organization of an awards ceremony.

In his remarks to the young scientists, Serzh Sargsyan attached importance to the works implemented, underscored that the state will continue to support science, including young scientists, and to encourage engaging in science as much as possible, to boost science in our country without which, according to the President, it is impossible to imagine how Armenia will develop. Serzh Sargsyan noted that it is important for young scientists to have the state's undivided attention and care which will gradually increase as the country is expanding its abilities.

The President placed value on his regular meetings with young scientists and on discussions pertaining to science issues and development prospects, which are targeted at rendering more effectively the ongoing programs and public policy in this area.

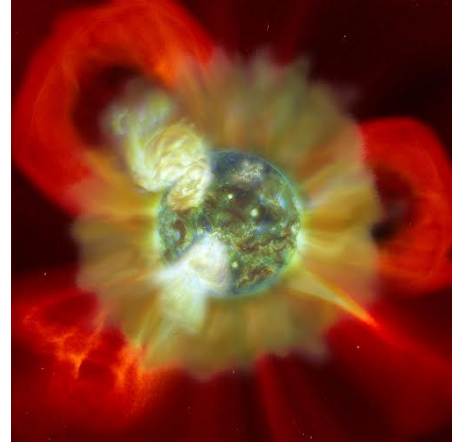


Prior to listening to the report of the young scientists, the President watched the exhibition at the National Academy of Sciences, displaying the activities of the YSSP beneficiaries.

Byurakan Astrophysical Observatory (BAO) also participated at the exhibition. BAO young scientists represented BAO activities and young scientists activities and results obtained in 2012-2014, including publications, participation in research projects and grants, foreign missions, participation in international conferences and summer/winter schools, modern astronomical projects, 4th Byurakan International Summer School (4BISS, 2012) co-funded by YSSP and other activities.

FIERCE ‘SUPERFLARES’ FROM THE SUN ZAPPED AN INFANT EARTH

Our young sun may have routinely blasted Earth with gobs of energy more powerful than any similar bombardments recorded in human history. Huge bursts of these particle and radiation “showers” ignited by these so-called “superflares” could have penetrated Earth’s protective magnetic fields and bathed our planet’s atmosphere, a new study has shown. Superflares, therefore, likely had profound impacts on the development of life on our planet. The findings stem from a growing set of observations of other stars like the Sun. NASA’s Kepler spacecraft spotted the brightening characteristic of flares in Sun-like stars it monitored for over four years. Although flares commonly erupt from the Sun and it appears other stars as well, frequency does not render these stellar explosions any less impressive. “Solar flares represent the most violent eruptions in the Solar System,” said Vladimir Airapetian, senior astrophysicist at NASA’s Goddard Space Flight Center and a research professor at George Mason and Capella Universities. “They release energy comparable to a couple billion megatons of TNT in a few minutes.” Airapetian was the lead author of a new paper on the findings appearing in the Proceedings of 18th Cambridge Workshop on Cool Stars, Stellar Systems, and the Sun Proceedings of Lowell Observatory. The Kepler data, along with observations of two Sun-like stars by Japanese astronomers, have revealed that the Sun’s documented spasms might be rather mild and rare in modern times, fortunately for us.



The ‘Big One’

The biggest flare event in recent history was the so-called Carrington event in 1859, named after the British astronomer Richard Carrington. He documented a brightening of the Sun near a group of sunspots—often the site of flares—that preceded an incredible aurorae display. Astonished sky gazers reported the colorful Northern Lights as far south as the Caribbean. Aurorae are caused by particles of air getting charged up by energy from the flaring Sun as it floods into the atmosphere at Earth’s poles. Based on the Carrington event and smaller, more recent Sun-spawned disruptions, many scientists and policymakers worry about a devastatingly powerful flare crippling our technology-dependent, modern society. Airapetian’s study affirmed these concerns as justified. Observations of 279 Sun-like stars detected signs of brightening comparative in size to the Carrington event, but also superflares on the order of 10,000 times stronger than any flares known to have been unleashed by the Sun. “This discovery is hard to overestimate,” said Airapetian, “because it may uncover the ‘hidden powers’ of our Sun in the past, near or far future.”

Unruly Youth

Other research has found that young, Sun-like stars, much like young human children, are particularly prone to throwing tantrums. Early in their lives, stars rotate faster and are more magnetically active — conditions ripe for flare eruptions. Flares arise when magnetic field lines emanating from the Sun, which normally form “rubber band-like” loops, snap and reconnect, experiencing a sort of “short circuit,” as Airapetian calls it. A burst of lethal doses of solar radiation as well as the Sun’s constituent charged gas, or plasma, often spews out into space. When the latter is involved, the flare is said to have hurled a coronal mass ejection, or CME. Very active stars yield stronger and more frequent flares and CMEs. Airapetian said that according to his research team’s calculations, the young Sun in its first several hundred million years of life could have

cranked out an astounding 250 superflares per day. Of course, then as now, most superflares and associated CMEs would have missed Earth, a relatively small target in the Solar System. Still, statistically speaking, it looks likely that early Earth took the brunt of a solar blast more powerful than the Carrington event at the shocking rate of at least once a day — and for half an eon.

An Energetic Rain

To get a sense of the effects on early Earth from this sort of, as Airapetian put it, “fast and furious” superflare and super-CME bombardment, he and his team built computer models. The models simulated a relatively conservative super-CME, only about twice that of the Carrington event’s potency, and had it smash into a model of the Earth’s magnetosphere and upper atmosphere. For simplicity’s sake, Airapetian assumed that Earth had developed a magnetic field of similar intensity as today’s about 500 million years after its birth, shortly following the Sun’s genesis 4.6 billion years ago. The presence of this field would probably have overlapped for a time with the Sun’s youthful superflare activity. Life, perhaps not incidentally, is thought to have emerged about 3.8 billion years ago, after the magnetic field’s formation. According to the new study, early Earth’s magnetic field would have buckled under the raging Sun’s onslaught. “In our paper, we have shown that a super Carrington-type CME event would have greatly compressed the magnetic field,” said Airapetian. “This would ignite huge electric currents on Earth and let energetic particles penetrate the Earth’s atmosphere and surface.”

Giver, or Taker, of Life?



What exactly this radiation would have done to hinder or perhaps, counterintuitively, help life’s rise, is debatable. The timing of a modicum of protection against the superflaring young Sun, thanks to a magnetic field, suggests the complexity of life’s self-replicating chemistry could not have withstood the young Sun’s energetic interference. However, continuing research by Airapetian suggests superflares and CMEs from the Sun might have been integral to life’s rise. Such energetic radiation could have broken apart nitrogen molecules with very tightly bound atoms in the early Earth’s atmosphere into free,

individual nitrogen atoms. From the perspective of chemistry, nitrogen atoms bond well with other atoms. Thus set free by superflares, the nitrogen atoms could have then combined with hydrogen and carbon, creating “organic molecules that can set favorable conditions for creating the building blocks of life,” said Airapetian. Furthermore, the nitrogen atoms could have combined with hydrogen forming ammonia in the atmosphere, a greenhouse gas that might have played an important role in warming the early Earth. It’s been a long-standing mystery how inert, molecular nitrogen in early Earth’s atmosphere ever broke down into atomic nitrogen. Life performs this task all the time, but it begs the chicken-or-the-egg scenario of how life ever formed without available nitrogen, and how nitrogen was ever available without life. Superflares might provide the answer. “On one hand, our studies suggest that the harsh conditions introduced by intensive radiation from flare and CME activity had a detrimental effect on life,” he said. “On the other hand, high levels of steady, intense radiation could have opened a ‘window of opportunity’ for the origin of life on Earth by setting a stage for prebiotic chemistry it requires.” Airapetian and colleagues have continued digging into these implications and promise new results soon.

Vladimir Airapetian

EUROPEAN ASTRONOMICAL SOCIETY 2015 PRIZES



Tycho Brahe Prize

The 2015 Tycho Brahe Prize is awarded to **Prof. Michel Mayor** in recognition of the development of instrumentation, which led to his discovery of the first extra-solar planet orbiting a solar-type star and to his leading role in this domain during the last twenty years.

Lodewijk Woltjer Lecture

The 2015 Lodewijk Woltjer Lecture is awarded to **Prof. Ewine van Dishoeck** for her outstanding career in molecular astrophysics, in particular in the domain of star and planet formation.

MERAC Prizes

The 2015 MERAC Prizes for the Best Early Career Researcher are awarded in

Theoretical Astrophysics

to **Dr. Michela Mapelli** for her theoretical and computational contributions to the dynamics of star clusters and galaxies, the reionization epoch, the Galactic centre, and the formation of massive stellar black holes.

Observational Astrophysics

to **Dr. Saskia Hekker** for her ground-breaking contributions to the understanding of the internal structure of red-giant stars based on stellar oscillations measured by the CoRoT and Kepler satellites.

New Technologies

to **Dr. Sylvestre Lacour** for his development of pupil masking and pupil remapping observing techniques, which provide a unique combination of high contrast and high angular resolution to study the immediate environment of stars.

The awardees are invited to give a plenary lecture at the European Week of Astronomy and Space Science (EWASS) to be held in Tenerife, Spain on 22 – 26 June 2015.

The Tycho Brahe Prize is awarded in recognition of the development or exploitation of European instruments or major discoveries based largely on such instruments.

The Tycho Brahe Prize is funded by the [Klaus Tschira Stiftung](#), a German foundation, which was established by the physicist Klaus Tschira in 1995 as a non-profit organization. The Klaus Tschira Stiftung promotes the advancement of the natural sciences, mathematics, and computer science, and wants to raise appreciation for these fields.

Klaus Tschira Stiftung
gemeinnützige GmbH



Tycho Brahe Prize

The 2015 Tycho Brahe Prize is awarded to **Prof. Michel Mayor** in recognition of the development of instrumentation, which led to his discovery of the first extra-solar planet orbiting a solar-type star and to his leading role in this domain during the last twenty years. The European Astronomical Society awards its 2015 Tycho Brahe Prize to Professor Michel Mayor in recognition of his lifelong quest to advance the precision, efficiency and scientific value of stellar radial velocity observations. His series of ground-breaking instruments have reduced velocity errors by an unprecedented ~ 3 orders of magnitude, down to 1 m/sec or lower. The vast scientific rewards include fundamental breakthroughs in binary and pulsating star properties, star cluster dynamics and Galactic evolution, culminating in the discovery of the first extra-solar planet 20 years ago and the birth of a new scientific discipline – with European leadership throughout. The exponential growth of exoplanetary science continues today with new theory and observations from the ground and space.

With his background in Galactic evolution, Michel Mayor realized the need for drastic improvements in the efficiency and accuracy of stellar radial-velocity observations. Cross-correlation of an observed spectrum with a suitable template, first proposed by Fellgett in the 1950s and demonstrated in practice by Griffin in the 1960s, seemed to be the answer. However, an instrument was needed that would pack optical efficiency, mechanical stability and state-of-the-art computer control into the limited space available inside the fork of the 1-m Geneva telescope at the Observatoire de Haute-Provence (OHP). The result was CORAVEL, which functioned flawlessly from 1977 through 20 years of service (a second CORAVEL was commissioned on La Silla in 1981) – a tribute to the thorough analysis and superb engineering behind this instrument. The huge gains in precision, zero-point stability and efficiency of the CORAVELs led to breakthroughs on fundamental studies of Solar-type binary stars, globular cluster dynamics, and local Galactic kinematics, structure and evolution. But also studies of the membership and binary populations of open clusters, precise mass and radius determinations of eclipsing binaries, the motions of field stars and Cepheids in both Magellanic Clouds, among many other topics received an enormous boost from these productive instruments. At the end of the 1980's, Michel Mayor's interests moved towards the search of substellar companions of solar type stars. The completion in 1994 of the fibre-fed bench-mounted spectrograph ELODIE at the 2-m telescope at OHP, another joint French-Swiss achievement, was at the basis of the seminal discovery of the first exoplanet in 1995. The totally unexpected properties of this Jupiter-sized planet orbiting the star 51 Peg every 4 days overturned all theories on the formation of planetary systems overnight. Sceptics concerning the planetary origin of the observed velocity variations were silenced by the 2000 discovery of the first transiting exoplanet and the demonstration of the Rossiter-McLaughlin effect by this planet with ELODIE. The rest is history, and the exponential growth of exoplanet science – with new theory and observations from the ground and space – continues with no end in sight.

To remove the last source of instability in ELODIE – a variable atmospheric pressure – Michel Mayor initiated the construction of the ultimate instrument, HARPS, mounted in a vacuum vessel with temperature controlled at the mK level. The two HARPS instruments still hold the world record for velocity errors – an unprecedented 1 m/s or lower – and the goal of finding Earth-mass exoplanets is finally within reach. In summary, Michel Mayor's relentless pursuit of instrumental perfection and constantly vigilant eye for opportunities in a broad range of scientific fields led to the birth of a new scientific area with sustained European leadership exactly twenty years ago.



Michel Mayor is a Swiss astronomer born in 1942. He completed his studies at University of Geneva in 1971 with a PhD on the kinematical and dynamical properties of stars in the solar vicinity. He has remained at this University ever since, rising to the rank of Professor and Director of the Observatory. He is first author or co-author of over 400 refereed papers on a wide range of subjects, with over 30'000 citations, and has received numerous honorary doctorates and prizes, including the Shaw, Balzan, Viktor Ambartsumian and BBVA prizes.

The Lodewijk Woltjer Lecture honours astronomers of outstanding scientific distinction.



Lodewijk Woltjer Lecture

The 2015 Lodewijk Woltjer Lecture is awarded to **Prof. Ewine van Dishoeck** for her outstanding career in molecular astrophysics, in particular in the domain of star and planet formation.



Ewine F. van Dishoeck's research is at the boundary of astronomy, laboratory astrophysics and chemistry and uses ground- and space-based observatories in the infrared and sub-millimetre range. Her current scientific focus is on the physical and chemical evolution of material from interstellar clouds to planet-forming disks and the importance of molecules as diagnostics of the star-formation process.

The launch of ESA's Infrared Space Observatory (ISO) in 1995 offered Ewine van Dishoeck a first opportunity to detect from space – away from the contamination by Earth's atmosphere – the presence of water, carbon dioxide, methane and formic acids in the interstellar medium. By being part of a legacy programme of the Spitzer Space Telescope – NASA's successor to ISO launched in 2003 – she

participated to the discovery of new-born stars enshrouded in dark molecular clouds.

The Spitzer observations of dusty disks rotating around nascent stars yielded discoveries of water, ammonium, and methane ices in these planet-forming disks. More interestingly, her research group found hydrogen cyanide (HCN) and acetylene (C₂H₂) gases, which are prebiotic molecules. The study of such building blocks for amino and nucleic acids became easier with the launch of ESA's Herschel Space Telescope in 2009, which is particularly suited for the study of water and its key role in interstellar chemistry. The recent completion by ESO of the Atacama Large Millimetre Array (ALMA) in Chile enables now Ewine van Dishoeck's group to study the subtle chemistry of proto-planetary disks with unprecedented angular resolution and sensitivity.

[Partly based on the article [Profile of Ewine F. van Dishoeck](#) by

Nick Zagorski 2006 PNAS **103**,12229]

Ewine F. van Dishoeck is a Dutch astronomer and chemist born in 1955 in Leiden. Graduated at Leiden University, she held positions in the United States at Harvard, Princeton and Caltech from 1984 to 1990. She returned to the University of Leiden in 1990, where she became professor of molecular astrophysics in 1995. She is also an external scientific member of the Max Planck Institute for Extraterrestrial Physics in Garching. She authored or co-authored more than 450 refereed publications with over 25'000 citations and holds many national and international science policy functions, including scientific director of the Netherlands Research School for Astronomy (NOVA), president of Division H of the International Astronomical Union, former member of the Board of the Atacama Large Millimeter/submillimeter Array (ALMA), co-PI of the MIRI instrument on the James Webb Space Telescope (JWST) and co-I of the HIFI instrument on the Herschel Space Observatory. She has been fortunate to receive the Dutch Spinoza award, an ERC Advanced grant, and the Dutch Academy Prize. She is a Member of the Dutch Royal Academy of Sciences and the Leopoldina German Academy of Sciences, Foreign Associate of the US National Academy of Sciences, and Foreign Member of the American Academy of Arts and Sciences.

MERAC Prizes

[FONDATION MERAC](#) (Mobilising European Research in Astrophysics and Cosmology) is a non-profit foundation started in 2012 with headquarters in Switzerland to recognize and support young European astronomers.



There are yearly three MERAC Prizes awarded by the [European Astronomical Society](#). The prizes of 20,000 EUR are for each of the three categories:

- ★ Theoretical Astrophysics
- ★ Observational Astrophysics
- ★ New Technologies (Instrumental/Computational)

The prizes alternate by year for:

- ★ Best Early Career Researcher Prizes (on odd years)
- ★ Best Doctoral Thesis Prizes (on even years)

The awardees are also eligible for further support from the FONDATION MERAC.

The MERAC Prize Committee was impressed by the high quality of the nominated candidates for the three MERAC Prizes of 2015.

Best Early Career Researcher in Theoretical Astrophysics

The 2015 MERAC Prize for the Best Early Career Researcher in Theoretical Astrophysics is awarded to **Dr. Michela Mapelli** for her eclectic theoretical and computational contributions to the dynamics of star clusters and galaxies, the reionization epoch, star formation in the Galactic centre, and the formation of massive stellar black holes from the collapse of metal-poor stars.

Michela Mapelli studied Physics at the University of Milano Bicocca (1998-2002), where she received her Master degree in February 2003, with a Thesis on 'Four-body interactions in globular clusters'. In October 2006, she received her PhD at SISSA, with a Thesis on 'Relic signatures of reionization sources', for which she was awarded both the Gratton Prize 2007 and the Tacchini prize 2007. In 2007, she became postdoctoral fellow at the Institute for Theoretical Physics of the University of Zurich, Switzerland, where she studied the formation of giant low-surface brightness galaxies. She was awarded there the prestigious 'Forschungskredit' fellowship in 2008 before receiving an independent postdoctoral fellowship at the University of Milano Bicocca in 2009. In August 2011, she started a permanent research position at INAF – Padova Astronomical Observatory, where she created her independent research team.



Michela Mapelli's main scientific achievements of the last five years are her studies on the formation of massive stellar black holes from the collapse of metal-poor stars and her contribution to understanding star formation in the Galactic centre. In 2009, she proposed that black holes of more than 20 and up to 80 solar

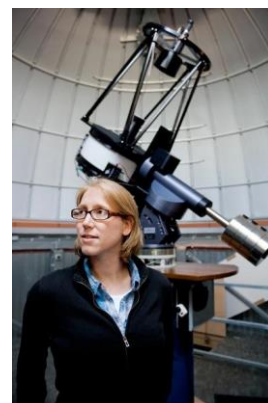
masses can form in the local universe from the direct collapse of metal-poor stars. This can explain why ultra-luminous X-ray sources (ULXs) occur more frequently in galaxies of low-metallicity, with considerable implications for high-energy astrophysics and the search of gravitational waves. In 2012, she simulated the disruption of a molecular cloud by the tidal shear of the super-massive black hole in the Galactic centre and showed that a gaseous disc forms and then fragments into proto-stellar clumps, thus explaining the presence of young, massive stars at the centre of our Galaxy.

The work of Michela Mapelli has been conducted entirely in Europe. After graduating in 2006 at SISSA (Trieste), she developed the model of massive stellar black holes during the post-doctoral fellowship at the University of Zurich, Switzerland, and then at the University of Milano Bicocca, Milan, Italy (2009–2011). Since 2011 she is Researcher at INAF – Padova Astronomical Observatory, Italy, where she has continued investigating massive stellar black holes, and started working on the Galactic centre.

Best Early Career Researcher in Observational Astrophysics

The 2015 MERAC Prize for the Best Early Career Researcher in Observational Astrophysics is awarded to **Dr. Saskia Hekker** for her ground-breaking contributions to the understanding of the internal structure of red-giant stars. She was first to establish non-radial oscillations in high-precision time-resolved spectroscopy of such stars and played a key role to confirm such modes in CoRoT space data. She also developed innovative techniques used to analyse and interpret Kepler observations of red giants.

After receiving her PhD from the University of Leiden in the Netherlands in Sept. 2007, Saskia Hekker worked at the Royal Observatory of Belgium and the University of Birmingham. In 2011 she was awarded a personal 3-year Veni Fellowship from the Netherlands Organization for Scientific Research to conduct research at the Astronomical Institute 'Anton Pannekoek', University of Amsterdam. Since September 2013, she works in Göttingen at the Max Planck Institute for Solar System Research (MPS). In 2013 she obtained a European Research Council (ERC) Starting Grant to determine Stellar Ages through asteroseismology. In 2014, she was awarded a Max Planck Independent Research Group focusing on 'Asteroseismology and Galactic Evolution', which is an international node of the 'Stellar Astrophysics Centre', a Centre of excellence in research of the Sun, Stars and Extra-solar planets. Her career path and mobility is outstanding, particularly since Saskia is also a mother.



Saskia Hekker announced, already during her PhD, non-expected, non-radial oscillations in red-giant stars which she then confirmed using data of the CoRoT satellite. She was also heavily involved in the discovery, identification, and analysis of mixed oscillation modes, which allow to probe the core region of the stars, in particular to disentangle hydrogen-shell- from helium-core-burning red giants. She discovered the first red giant in an eclipsing binary and developed methods to determine global asteroseismic parameters, which she then applied to Kepler data of planet-hosting stars.

Saskia Hekker performed her work at the School of Physics and Astronomy, University of Birmingham, United Kingdom (2009–2011); Astronomical Institute “Anton Pannekoek”, University of Amsterdam, the Netherlands (2011–2013) and the Max Planck Institute for Solar System Research, Göttingen, Germany (2013–present).

Best Early Career Researcher in New Technologies

The 2015 MERAC Prize for the Best Early Career Researcher in New Technologies is awarded to **Dr. Sylvestre Lacour** for his development of pupil masking and pupil remapping observing techniques, which provide a unique combination of high contrast and high angular resolution to study the immediate environment of stars.

After his graduation from Ecole Normale Supérieure in electrical engineering, Sylvestre Lacour worked at The Johns Hopkins University from 2000 to 2002 as software engineer for the FUSE satellite. He pursued with a PhD in astrophysics on a project combining pupil remapping and long-baseline optical interferometry. It consisted partly in building a single-mode pupil remapping prototype instrument (FIRST), and partly in acquiring and interpreting observations from the IOTA interferometric array (Mount Hopkins, Arizona). After the successful defence of his PhD in 2007, he obtained a Lavoisier fellowship to pursue his research in high angular resolution instrumentation at the University of Sydney. He developed there a strong expertise in the emerging technique of pupil masking. Over the last years, he benefits from a CNRS tenured position at the Observatory of Paris, allowing him to work on the application of the pupil masking technique to the study of young stellar objects. As an expert in high precision astrometry, he is also deeply involved in the GRAVITY instrument for the VLT Interferometer.



Sylvestre Lacour is the leading European specialist in the pupil masking and pupil remapping observing techniques. These two techniques provide a unique combination of high contrast and high angular resolution that is key to studying the immediate environment of stars in all evolutionary stages. He also developed a complete pipeline to reduce this kind of observations, which are now performed by major astronomical facilities. This effort led to an important result on scattering dust around evolved stars and opened a new observational window on the inner structure of transition disks, where extrasolar planets are expected to form.

Sylvestre Lacour started working in the field of interferometry since his PhD at the Observatoire de Paris. He then fully developed the field aperture masking during the Lavoisier Fellowship at Sydney University and a second post-doctoral position at the Observatoire de Grenoble. Since 2009 he is affiliated with the Observatoire de Paris, France.

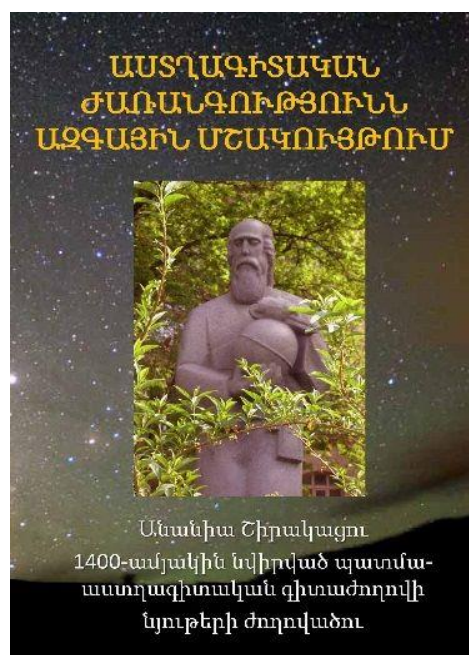
ABSTRACTS OF THE MEETING “ASTRONOMICAL HERITAGE IN THE NATIONAL CULTURE”

As reported, the Proceedings of Archaeoastronomical Meeting “Astronomical Heritage in the National Culture” dedicated to the 1400th anniversary of Anania Shirakatsi and XI Annual Meeting of Armenian Astronomical Society were published by Armenian National Academy of Sciences “Gitutyun” Publishing House. The editors are Haik Harutyunian, Areg Mickaelian and Elma Parsamian.

Abstracts are now available at ADS (<http://adswww.harvard.edu/>). Most of the articles (16) relate to the field of Archaeoastronomy and Astronomy in Culture:

Parsamian, E. S. - Archaeoastronomy in Armenia // p. 12-22

A review of Archaeoastronomy in Armenian is given, especially emphasizing on ancient observatories. The author was the first to study such archaeoastronomical sights, as ancient observatories Metsamor, Zorats Karer, etc. Some calculations on observations of planets and definite stars from these sights are given.



Harutyunian, H. A. - Armenian Vahagn God as birth of four Cosmic elements // p. 23-28

The survived two snatches of the mythological history about Vahagn – the Armenian god of the Sun and Fire is analyzed to find fingerprints of ancient cosmology. In the first fragment known as “Birth of Vahagn” all the four primary elements are mentioned as travelling ones which brought the god into life. The second fragment devoted to the ancient conception on the formation of the Milky Way named in Armenian mythology “Straw Thief’s Way”. The fact that both survived fragments concern the structure of the Universe might be explained easily if the ode glorifying Vahagn was based on the ancient Armenian cosmological views.

Ter-Gulanyan, Ani - Ancient Astronomical Hieroglyphs of the Armenian Highland and their Echo in Architectural Structures // p. 29-35

The credo-spiritual structure formed as a result of astronomical knowledge in the Armenian Highland and recognition of the universe, with its symbolistic signs – which, in our opinion, were expressed in particular by astronomic horoscope hieroglyphs - have had their worship and spiritual speculative feedback both in architecture and in different other arts, especially in symbolic jewelry. A visible link is noticed between the shift of constellations and the civilization development phases. Identification of archeological sources gives the ground to conclude that Armenia has been one of the centers of astronomy. The astronomical signs, having a local origin and having formed ancient astronomical-worship, spiritual-credo structure, have found the feedback of its developments also in other biospheres with respective unique manifestations, in both ancient pagan church architecture and the Christian church architecture, both as a volume form and as a spiritual ideology, with its credosymbolistic signs.

Farmanyanyan S. V.; Mickaelian, A. M. - Sun and Sun Worship in Different Cultures // p. 36-43

The Sun symbol is found in many cultures throughout history, it has played an important role in shaping our life on Earth since the dawn of time. Since the beginning of human existence, civilisations have established religious beliefs that involved the Sun's significance to some extent. As new civilisations and religions developed, many spiritual beliefs were based on those from the past so that there has been an evolution of the Sun's significance throughout cultural development. For comparing and finding the origin of the Sun we made a table of 66 languages and compared the roots of the words. For finding out from where these roots came from, we also made a table of 21 Sun Gods and Goddesses and proved the direct crossing of language and mythology.

Mickaelian, A. M. - Armenian Astronomical Heritage // p. 44-55

A review is given on the Armenian Astronomical Heritage from ancient times to nowadays. Armenian ancient astronomy includes the division of the skies into constellations, rock art, ancient Armenian calendar, ancient observatories (such as Metsamor and Karahunge), records of astronomical events (such as Halley's Comet recorded on Tigranes the Great's coin), ancient names of celestial bodies (planets, stars, constellations), etc. The Medieval Armenian astronomy includes two more calendars, Anania Shirakatsi's scientific heritage, the record of 1054 Supernova, sky maps by Luca Vanandetsi and Mkhitar Sebastatsi, etc. Modern Armenian astronomical heritage first of all consists of the famous Byurakan Astrophysical Observatory founded in 1946 by Viktor Ambartsumian, as well as Yerevan Astronomical Observatory, Armenian Astronomical Society, Armenian Virtual Observatory, Yerevan State University Department of Astrophysics, *Astrofizika* journal, and brilliant young students who systematically win high positions at International Astronomical Olympiads.

Nazaryan, L. S. - Anania Shirakatsi's Life and Activities // p. 58-67

Anania Shirakatsi is one of the greatest scientists who made an important contribution to the field of exact sciences in Armenia, a brilliant scientist and philosopher of the 7th century; actually the founder of exact sciences in Armenian reality. Unfortunately, out of Shirakatsi's rich heritage only some fragments of his works in the fields of Mathematics, Cosmography, Calendarology, Metrology, which are of great value for the history of exact sciences, got to us. There is a valuable source about Anania Shirakatsi's life and work; the author has left his autobiography. From Shirakatsi's autobiography we learn that he was born in the village Aneank (Shirakavan) at the beginning of the 7th century. He got his elementary education in the local monastery school, later being eager to improve his knowledge, he went to West Armenia. He had to travel a lot about West Armenia seeking an advanced specialist in Mathematics. He was leaving for Constantinople but on his way to Signup he learns that in Trapeze a great Greek scientist, Tyukhik lives: "a wise man, popular with the kings, an expert on Armenian Language and Literature". Shirakatsi changed his way and went to Trapeze. Shirakatsi had been at Tyukhik's school for 8 years; he became proficient in exact science and came back to his native land with rich knowledge base. Here he opened a school and devoted himself to teaching and research. He wrote research works in Astronomy, Mathematics, Geography, Calendarology, Metrology and in other fields of science.

Arevshatyan, Sen - Anania Shirakatsi's Natural Philosophical Views // p. 68-75

A review on Anania Shirakatsi's natural philosophical views is given. He was the first to distinguish natural sciences from philosophy, establishing the basis for such sciences as mathematics, cosmography, astronomy, meteorology, chronology, and metrology. Shirakatsi's works are discussed related to these sciences.

Danielyan, Eduard - Anania Shirakatsi's Cosmographical and Natural Philosophical Views // p. 76-86

The observation of the heaven and celestial bodies has taken place since ancient times in the Armenian Highland. The notions of the sphericity of the Earth and celestial bodies, and other theses (about elements, comparative sizes of celestial bodies, antipodes, earthquakes, criticism of astrology, etc.) were reflected and elaborated in "Cosmography" of Anania Shirakatsi (VII century AD), as well as "Ashkharhatsoyts" ("Geography") of Movses Khorenatsi (V century AD) and his continuer Anania Shirakatsi. The road of observation and study of the Milky Way – the fundamental kernel of the development of astronomy – has led the human mind to galaxies, the cognition of the infinite capabilities of the development of matter, that is to say, from the studies of the elements constituting the Earth and other spherical bodies in the Universe (studied by Aristotle) to the Heliocentric system by Copernicus (1473-1543), from the cosmogonic ideas of Democritus (460-370 BC) about the multitude of worlds and the character of the Milky Way and their reflection in natural philosophic views of Anania Shirakatsi to the discovery of non-stationary objects and processes in the Universe owing to the activity of the nuclei of galaxies, according to the cosmogonic conception of academician Victor Ambartsumyan. Anania Shirakatsi's scientific heritage greatly contributed to the development of Armenian and world natural scientific thought.

Harutyunian, H. A.; Mickaelian, A. M. - Anania Shirakatsi's Cosmographical Works and the Methodology of his Natural Science // p. 87-97

A review of Anania Shirakatsi's cosmographical works and the methodology of his natural science is given. It is based mainly on Shirakatsi's "Cosmography", which is based on the achievements of Greek astronomy, its further transformations and Shirakatsi's own observations. Individual parts of the book, such as "About the sky", "About the Earth", "About the heavenly bodies", "About the Milky Way", "About the Moon", and "About the Sun" are discussed.

Eynatyan, Julieta - Anania Shirakatsi's Overheads System // p. 98-106

A review of Anania Shirakatsi's overheads system is given based on his chronological works. Lunar, solar and lunisolar calendars are discussed. Anania Shirakatsi is presented as having an important role in the establishment of the Armenian unique chronology.

Tokhatyan, Karen - Origins Rock Art and Calendar in Armenia and Anania Shirakatsi // p. 107-133

A review on the origin of rock art and calendars in Armenia, as well as Anania Shirakatsi's views are given. Astronomy and calendar, formation of the constellations, types of calendars, the Armenian ancient calendar, Armenian Hayk/Orion constellation and corresponding mythological heroes, and further phases of the Armenian calendar are discussed.

Vardumyan, Gohar - Anania Shirakatsi and "Pagan" Scientists // p. 134-141

Anania Shirakatsi's approach to the views of "Pagan" scientists is discussed. He had special attitude to ancient science and its representatives. In his various works he criticizes their wrong views. Shirakatsi was especially good in distinguishing the correct and erroneous points of view by different scientists and he could chose the right approach and add his own one.

Yerznkyan, Nora - Religious-Historical Sublayers in Anania Shirakatsi's Works // p. 142-148

This work is forward-looking with its content, because 7th century mathematician, geographer and one of the most important representatives of natural sciences in the Middle Ages Anania Shirakatsi is mostly recognized in the frames of above-mentioned sciences and his works are mainly studied under this angle. However this article is a sort of guide to focus reader's attention not only on his works about natural sciences, but also on his religious and historical observations. Some parts of his works give clear description about some historical events in Armenia which is very important in highlighting social and economic relations. In order to prove the importance of his works, it is enough to mention that Shirakatsi in his "Khndragirq" (book of tasks) gave several examples which was later used to prove the existence of vassal living in the early feudal stages, which is an important historical fact.

Shakhkulyan, Tatevik - Anania Shirakatsi Musician // p. 149-157

Anania Shirakatsi's musical works are described and discussed. Though his main works and activities were in the area of exact sciences, but he was also a musician and he has a crucial role in the history of the Armenian music. Anania Shirakatsi's main domain was the religious music, particularly he wrote a number of so-called "Sharakans". He has also studies acoustics.

Harutyunyan, G. S. - Shirakatsi Crater on the Moon // p. 158-159

One of the Moon's craters is named after Anania Shirakatsi. It was named due to Viktor Ambartsumian's application to the International Astronomical Union. The crater has 51km diameter and is coupled with the neighboring crater Dobrovolski.

Mickaelian, A. M.; Mikayelyan, G. A. - Anania Shirakatsi's Webpage // p. 160-164

Anania Shirakatsi webpage is presented and described. It is created on the occasion of his 1400th anniversary. The webpage contains following menus: Anania Shirakatsi's biography at ArAS website, his biography in different encyclopedia, an article by Lilit Nazaryan, Internet weblinks related to Anania Shirakatsi, areas of research, list of his works, books about Anania Shirakatsi (most important 43 ones), events connected to his 1400th anniversary, "Shirakatsi" crater on the Moon, Shirakatsi order, memorial coin and stamp, Anania Shirakatsi college, Armenian archaeoastronomy, international organizations related to Astronomy and World Heritage. Anania Shirakatsi's webpage plays an important role in the overall presentation of his life and activities.

REPUBLICAN SCHOOL ASTRONOMICAL OLYMPIAD

The final (Republican) phase of Astronomical School Olympiad was held at Yerevan Phys.- Math. School (PMS) after A. Shahinyan on March 31. In total 15 pupils participated. Ashot Hakopian, BAO senior researcher, was the Chair of the Jury and the other members were Avetik Grigoryan, Marietta Gyulzadian, Emilia Karapetian, Areg Mickaelian, Tigran Nazaryan and Sergei Nersisyan.



Five problems were offered from the fields of celestial mechanics, astrometry, astrodynamics and radiation theory. Most of the participants showed deep knowledge and displayed high results. Pupils from PMS, and “Quantum” college showed the best results.

Below are the results:

First-rank diploma to:

- Hrant Topchyan (PMS),

Second-rank diploma to:

- Edgar Vardanyan (PMS)

Third-rank diplomas to:

- Edvard Khalafyan (“Quantum”)
- Mikayel Mkrchyan (PMS)
- Ashot Matevosyan (“Quantum”)
- Ashot Movsisyan (“Quantum”)

This Olympiad was also a qualifying phase for International Olympiad of Astronomy and Astrophysics (IOAA) to be held in August in Indonesia and International Astronomical Olympiad (IAO) to be held this fall in Bulgaria.

Let us remind that the Armenian pupils have excellent traditions at IAO and IOAA, having 9 gold, 5 silver and 19 bronze medals in total and by team counts being one of the best during the whole 20-year history of Olympiads.

RELEASE OF ASTROPHYSICS MARCH ISSUE



NAS RA journal “*Astrophysics*” (Russian translation of “*Astrofizika*”) Vol. 58, Issue 1 was released in March. Following papers are included:

A. L. Sukharev – Variability of the Extragalactic Radio Sources 3C 446 and BL Lac in the Centimeter Wavelength Range

T. D. Le – New Limit on the Spatial and Temporal Variations of the Fine-Structure Constant Using High Redshifts of Quasar Spectra

Fuyang Zhang, Xin-Fa Deng – $u-r$ Color Dependence of Galaxy Clustering in the Main Galaxy Sample of SDSS DR10

Yu. V. Glagolevskij – Evolution of the Magnetic Fields of Main-Sequence CP-Stars. V

A. É. Rosenbush, Yu. S. Efimov – Photometry, Spectrometry, and Polarimetry of FG Sge in the Active State

A. A. Akopian – Variability of Superflare Frequency of Sun Like Stars

G. S. Hajyan, A. G. Alaverdyan – Hot Strange Stars II. Numerical Results and Discussion

M. G. Abrahamyan – Vortices in Rotating Gravitating Gas Disks

V. R. Chirde, S. H. Shekh – Dark Energy Cosmological Model in a Modified Theory of Gravity

Sunil Kumar, A. K. Lal, Seema Saini – Vibrational Stability of Differentially Rotating Polytropic Stars

D. M. Sedrakian, M. V. Hayrapetyan – Mechanism for Radio Emission of Pulsars

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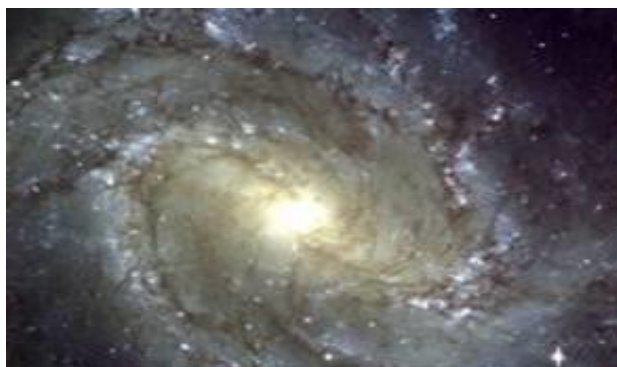
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ESO Messenger Newsletter is available at the following link:

<https://www.eso.org/sci/publications/messenger/archive/no.159-mar15/messenger-no159.pdf>



RELEASE OF ASTROCOURIER MARCH ISSUE



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- 50th Anniversary of the journal “Earth and Universe”
- 60th Anniversary of All-Russian Scientific-Research Institute of Physics-Technical and Radio-Technical Measurements
- Jubilee of Polina Evgenevna Zakharova

Conferences in 2015

- Scientific Conference “*Astronomy from nearby Universe to cosmological distances*”, dedicated to XII general meeting of the International NGO “Astronomical Society”, Moscow, SAI, 25-30 May
- XXXII Conference: “Actual problems of extragalactic astronomy”, Pushchino Radioastronomical Observatory, 20-24 April 2015
- 3rd International Conference “Meteorits, asteroids, comets” and school of young scientists “Chebarkul 2015”, 21-23 May 2015
- 45th Young European Radio Astronomers Conference – 2015 (YERAC 2015) 19-21 August 2015 Ventspils, Latvia
- To V.V. Sobolev’s 100th anniversary. Conference “Radiation mechanisms of cosmic objects: classics and modern views”, Saint Petersburg, 21-25 September 2015

Astrocourier Newsletter is available at the following link:

<http://www.sai.msu.su/EAAS/rus/astrocourier/310115.htm>

LIST OF BOOKS RELATED TO ARMENIAN ASTRONOMY

ArAS has released the list of those astronomical books that are published in 2000-2015 and somehow are related to Armenian astronomy (books written by Armenian astronomers, Proceedings of the conferences held in Armenia, books about Armenian astronomy, other astronomical books published in Armenia and other books related to Armenian astronomy). The list includes 46 books, which are scientific, popular or informative ones; for each book a bibliography and a brief description is given.

ASTRONOMICAL BOOKS / ԱՍՏՂԱԳԻՏԱԿԱՆ ԳՐՔԵՐ
2000-2015

All books related to Armenian astronomy / Հայկական աստղագիտության անկախ բոլոր գրքերը

Proceedings of the Colloquium "Instability and Evolution of Stars" dedicated to Ludwik Mirzoyan's 90th anniversary, held on 26-28 August 2013 in Byurakan, Armenia
H. A. Harutyunian, N. D. Melikian, E. H. Nikoghosyan (Eds.)
Yerevan, NAS RA "Gintyutn" Publishing House, ISBN 978-5-8080-1126-7, 158 p., Jan 2015 (in English)

These Proceedings present the papers reported at the Colloquium dedicated to Ludwik Mirzoyan's 90th anniversary held in 2013 in Byurakan Astrophysical Observatory. The book is divided into 4 parts according to the sessions of the Colloquium. The presented papers reflect nearly all main topics of scientific investigations in both Byurakan and Abastumani observatories. The book also includes a Preface by the editors, the List of participants of the colloquium and Author index at the end.

Proceedings of Archaeoastronomical Meeting "Astronomical Heritage in the National Culture" dedicated to Anania Shirakatsi's 1400th Birthday Anniversary and XI Annual Meeting of the Armenian Astronomical Society
H. A. Harutyunian, A. M. Mickaelian, E. S. Parsamian (Eds.)
Yerevan, NAS RA "Gintyutn" Publishing House, ISBN 978-5-8080-1115-1, 220 p., Oct 2014 (in Armenian)

The book contains Proceedings of the Archaeoastronomical Meeting "Astronomical Heritage in the National Culture" Dedicated to Anania Shirakatsi's 1400th Anniversary and XI Annual Meeting of the Armenian Astronomical Society. It consists of 3 main sections: "Astronomical Heritage", "Anania Shirakatsi" and "Modern Astronomy", as well as Literature about Anania Shirakatsi is included. The book may be interesting for astronomers, historians, archaeologists, linguists, students and other readers.

Viktor Ambartsumian: Life and Activities
A. M. Mickaelian
Yerevan, "Antares" Publishing House, ISBN 978-9939-51-078-3, 48 p., Sep 2014 (in English)

The booklet is dedicated to the outstanding Armenian astronomer and one of the great scientists of the XX century Viktor Ambartsumian. He has fundamentally contributed in various fields of astronomy and astrophysics, cosmogony, theoretical physics, mathematics, and philosophy. Ambartsumian was a great organizer of science, important political and public figure. He was the Director of BAO in 1946-1968, the President of the Armenian Academy of Sciences in 1947-1993, the President of the International Astronomical Union (IAU) in 1961-1964 and the President of the International Council of Scientific Unions (ICSU) in 1968-1972.

Proceedings of IAU Symposium #304 "Multiwavelength AGN Surveys and Studies" dedicated to Benjamin Markarian's 100th anniversary, held on 7-11 October 2013 in Yerevan, Armenia
A. M. Mickaelian, D. B. Sanders (Eds.)
Cambridge, Cambridge University Press, ISBN 978-110704524-8, 470 p. Aug 2014 (in English)

AGN are among the most interesting objects in the Universe. The book addresses the most important questions in this area: understanding the

In particular, the list includes Proceedings of 2 IAU meetings (Colloquium and Symposium) held in Armenia (2001 and 2013), Conference "Evolution of Cosmic Objects through their Physical Activity" dedicated to Viktor Ambartsumian's 100th anniversary, Conference of Young Scientists of CIS Countries (2011), Archaeoastronomical Meeting "Astronomical Heritage in the National Culture" dedicated to Anania Shirakatsi's 1400th Anniversary (2012) and Colloquium "Instability and Evolution of Stars" dedicated to Ludwik Mirzoyan's 90th Anniversary, JENAM-2007 Abstract Book, the Digitized First Byurakan Survey (2008), V. A. Ambartsumian's Selected Papers, Vol. 1 (2011), "Ambartsumian's Legacy and Active Universe" (2012), "Space Dynamics" by G. A. Gurzadyan (2002), books dedicated to Byurakan Astrophysical Observatory, Viktor Ambartsumian, Benjamin Markarian, Ludwik Mirzoyan and Anania Shirakatsi, as well as "From the Deep of Ages to the Universe" by A. E. Grigoryan (2013), "Viktor A. Ambartsumian's Descendants" by R. H. Sargsyan (2012), "Starry Sky" and "Astronomy" textbook by S. Ye. Nersisyan.

The list of Armenian Astronomical Books is available at the following link:

<http://aras.am/Books/books2000-2015.htm>

APRIL CALENDAR OF ASTRONOMICAL EVENTS

Monthly Calendar of Astronomical Events

April
2015

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
1	2	3	4 Full moon Total Lunar Eclipse	5 Junior Astronomers Club visit to Byurakan Observatory	6	7 ArAS member Bernhard Brandl's 50th anniversary
8 Conjunction of Mercury vs. Uranus	9 Herculids-1 meteor shower	10	11	12 Lunar crescent (last quarter)	13	14
15	16 Lyrids meteor shower	17	18 New moon Lunar occultation of Uranus	19 Mihran Vardanyan's 30th anniversary	20	21 Eta Aquarids meteor shower
22 Tigran Khanzadyan's 40th anniversary	23 Conjunction of Mercury vs. Mars	24	25 Astronomy Day Part 1, declared by the Astronomical League Lunar crescent (first quarter)	26	27	28
29	30 ArAS Newsletter #80 release	Hubble Space Telescope's (HST) 25th anniversary				