ArAS News

N E W S L E T T E R

ARMENIAN ASTRONOMICAL SOCIETY (A r A S)

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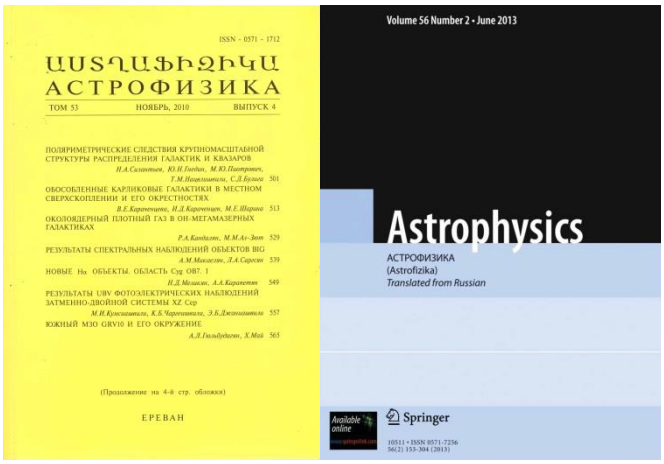
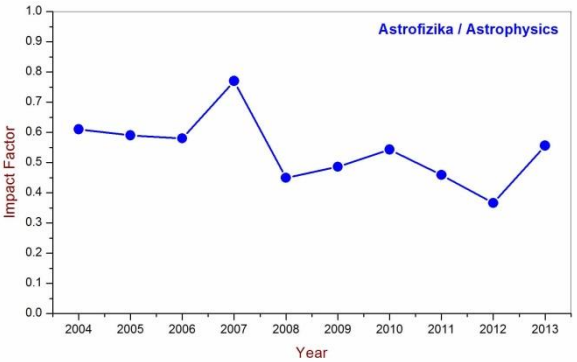
50th Anniversary of Journal Astrofizika/Astrophysics



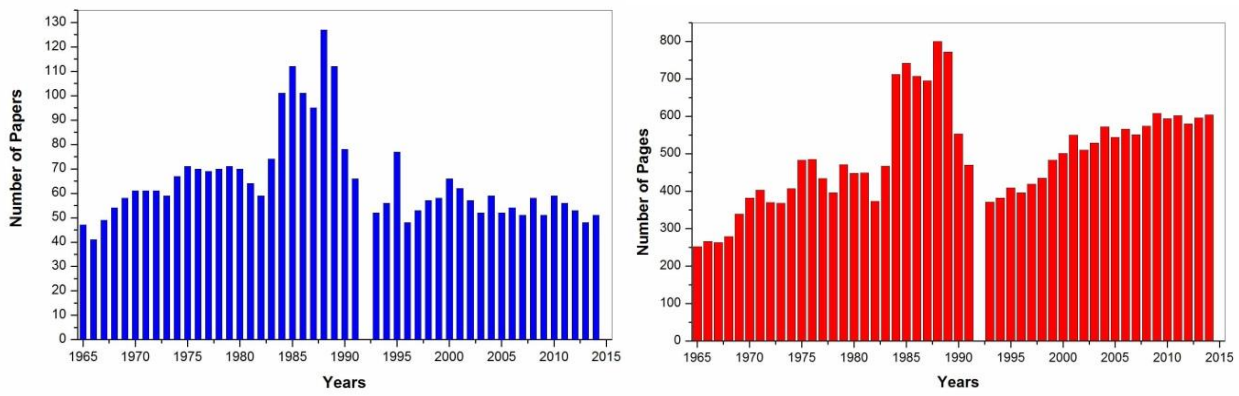
This year we celebrate 50thanniversary of the journal *Astrofizika/Astrophysics*(*Afz/Ap*), which was founded in 1965 on the initiative of Viktor Ambartsumian as an USSR All-Union journal to publish recent results in the field of astrophysics. The original journal is being published in Russian as "Астрофизика" (its digitized papers for the years 1993-2014 are present at NAS RA Fundamental Library at http://www.flib.sci.am/eng/Astrophysics/Frame.html) and later on, it is translated into English and re-published as"Astrophysics" (before by *"Plenum Publishing Corporation"* and at present by *"Springer"*).*Afz/Ap* publishes papers on Solar and Planetary Physics, Stellar Astrophysics, Variable Stars, Nebulae and Interstellar Matter, Active Galactic Nuclei, Stellar and Galactic Evolution, Large-Scale Structure of the Universe and Cosmology, Radiative Transfer Theory, Stellar and Planetary Atmospheres, Astroparticle Physics, Multiwavelength and Space Astrophysics, and Fields of Physics and Mathematics related to Astrophysics.

Afz/Ap is included in all major international databases (most important, abstracts are given in Astrophysical Data System, ADS, since 1965), in Armenian Higher Attestation Committee's list and has highest Impact Factor (IF) among all Armenian journals (2013 IF = 0.556), which is of course lower than those ofinternational prestigious journals, however it is significantly higher than other Armenian journals.The dynamics of *Afz/Ap* IF during 2004-2013 is given in figure on the right.



Academicians Viktor Ambartsumian (in 1965-1988), Ludwik Mirzoyan (in 1988-1999) and Davit Sedrakian (since 2000) have been the **Editors-in-Chief** of the journal. The present Editorial Board consists of Davit M. SEDRAKIAN (Armenia; Editor-in-Chief), Vladimir P. GRININ (Russia) and Arthur G. NIKOGHOSSIAN (Armenia; Deputy Editors-in-Chief), Arsen T. KALLOGHLIAN (Armenia; Executive Secretary), Editorial Board membersGeorges ALECIAN (France), Gennadi S. BISNOVATYI-KOGAN (Russia), Alexander A. BOYARCHUK (Russia), Anatol M. CHEREPASHCHUK (Russia), Yuri N. GNEDIN (Russia), Haik A. HARUTYUNIAN (Armenia), Vsevolod V. IVANOV (Russia), Igor D. KARACHENTSEV (Russia), Edward Ye. KHACHIKIAN (Armenia), Elma S. PARSAMIAN (Armenia), Guram N. SALUKVADZE (Georgia), Yervant TERZIAN (USA) and Massimo TURATTO (Italy).

Afz/Ap webpage has been created on the occasion of its 50th anniversary at http://www.aras.am/astrophysics/, where the history of its foundation and publication, Editorial Board, last years IF, fields of published papers, instructions for authors, summary of published papers in 1965-2014 (particularly surveys and other series, and review papers on various areas), list of most productive authors in 1965-2014 and related links are given. *Afz/Ap* had an important contribution to the field of astronomy and astrophysics both by its theoretical studies (including Viktor Ambartsumian's works) and a number of **series of important observational studies**, such as the First Byurakan Survey (FBS or Markarian Survey), morphology, photometry, spectroscopy and radio observations of Markarian galaxies, lists of the Second Byurakan Survey (SBS) and studies of SBS objects, lists of Kazarian galaxies and their studies,Compact Groups of Compact Galaxies (Shahbazian Groups) and their studies, FBS Second Part (Blue Stellar Objects, BSOs and Late-type stars) and studies of its objects, discoveries of flare stars in Pleiades, Orion and other stellar aggregates, discoveries of Herbig-Haro (HH) objects, Subfuors, Supernovae, and many other stars and young stellar objects, optical identification of IRAS point sources and studies of Byurakan-IRAS Stars (BIS) and Byurakan-IRAS Galaxies (BIG) and many others.



Number of papers and pages published in Afz/Ap in 1965-2014.

*Astrofizika/Astrophysics*all abstracts in English are present at "Astrophysics" webpage by *"Springer"*at (http://www.springer.com/astronomy/journal/10511).

NAS RA Decision on BAO ISAC Report

By NAS RA Presidium decision International Scientific Advisory Committee (ISAC) was created for NAS RA V. Ambartsumian Byurakan Astrophysical Observatory (BAO). ISAC was created forincreasing work efficiency and for arranging a new program for the development of the Observatory. The first visit of ISAC to Armenia was held on June 23-28, 2014. Within the visit the ISAC members had meetings with NAS RA President, BAO director and BAO scientists, closely got acquainted with BAO scientific themes, research activities and structure, visited BAO telescopes, and in December 2014 prepared and submitted a report on ISAC activities and conclusions regarding the future developments of BAO. A special emphasis is made on the role of NAS RA during the last 2 years directed at the upgrade of observational equipment and significant increase of BAO funding due to recognition of BAO as National Value by the Armenian Government.

NAS RA Presidium mentions the importance of the work carried out by ISAC, and thinks that the provisions of the conclusions can be applied to the improvement of the work of the Observatory. Taking BAO ISAC Report into consideration, its work results, and conclusions, as well discussions held with BAO scientists and their opinions, comments and suggestions, NAS RA Presidium decides.

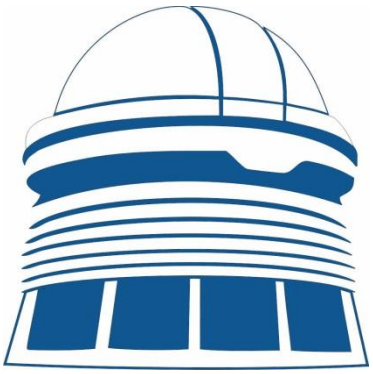
1. Instruct NAS RA Department of Physics and Astrophysics:

- Study BAO ISAC's suggestion on the Observatory Director's alternative options until April 30, and **to present recommendations about the issue of BAO Director candidates to NAS RA President**;
- Till May 30 organize **BAO Director's elections** and immediately after it hold **elections of BAO Scientific Council**. Give responsibilities to all members of BAO Scientific Council;
- Support the improvement of lecturers staff and Master's program of Yerevan State University (YSU) Chair of General Physics and Astrophysics, nominate BAO most productive scientists as candidates for the position of Vice-Chairman for Astrophysics of the above mentioned Chair;

- Support the modernization and Editorial Board work of the **journal "Astrophysics"**. Involve BAO most productive scientists in Editorial Board of the journal.

2. Instruct the newly elected Director:

- In a month develop and present to NAS RA Presidium **BAO Development Strategic Plan** taking into account as main directions of BAO's traditional research, so as BAO ISAC recommendations on the development of modern research subjects (extra-solar planets, high-energy astrophysics, cosmology, etc.). The strategic basics must consider most productive use of the telescopes and the possibilities of their involvement in international programmes;
- Present to the affirmation of NAS RA Physics and Astrophysics Department **BAO structure** (Administration, research and scientific-technical sub-divisions) taking into account BAO ISAC suggestions and strategic basics;
- According to the affirmed structure organize competitions for the heads of the created sub-divisions;
- In parallel to fundamental research departments organize a **Department of Applied Astronomy**;
- Unify BAO engineering and technical staff in a **Laboratory of Observational Toolsand Equipment Services**;
- Activate BAO seminars; introduce **review, analytical, information and report seminars**;
- Develop an action plan aimed at creation of necessary conditions for young astronomers professional development and their effective integration into the activities of the Observatory;
- Initiate the process of BAO membership to **European Southern Observatory (ESO)**, as well as cooperation processes with **OPTICON telescopes consortium**. Create working groups, which will study the certain issues and prepare the certain package.



BAO YOUNG SCIENTISTS ACTIVITIES 2012-2014

Recently RA President Serzh Sargsyan held a meeting with young scientists at the National Academy of Sciences of RA (see ArASNews #79 article). This event was in frame of Young Scientists Support Program (YSSP) and activities during 2012-2014 were presented, including publications, missions, participation in meetings and summer/winter schools, seminars, grants and awards.

Byurakan Astrophysical Observatory (BAO) also participated at the exhibition. BAO young scientists presented 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, seminars and other activities. For more visibility, here we give a summary of these activities.

Publications by BAO young scientists in 2012-2014

Refereed journals (33)

Valenti, S.; Taubenberger, S.; Pastorello, A.; **Aramyan, L.**; et al.,*Astrophysical Journal Letters, Vol. 749, No. 2, article id. L28, 2012.*

Gigoyan, K. S.; Russeil, D.; Mickaelian, A. M.; Sarkissian, A.; **Avtandilyan, M. G.,** *Astronomy & Astrophysics, Vol. 544, id.A95, 2012.*

Hakobyan, A. A.; Adibekyan, V. Zh.; **Aramyan, L. S.**; et al., *Astronomy & Astrophysics, Vol. 544, id.A81, 2012.*

Sargsyan, L.; Lebouteiller, V.; Weedman, D.; …; **Samsonyan, A.,** *Astrophysical Journal, Vol. 755, No. 2, article id. 171, 2012.*

Martirosian J.R., **Sargsyan L.A.,***Astrophysics, Vol. 55, No. 3, p. 306-316, 2012.*

Adibekyan, V. Zh.; Delgado Mena, E.; Sousa, S. G.; …; **Hakobyan, A. A.,** *Astronomy & Astrophysics, Vol. 547, id.A36, 2012.*

Movsessian, T. A.; Magakian, T. Yu.; **Sargsyan, D. M.**; Ogura, K., *Astrophysics, Vol. 55, No. 4, pp. 471-479, 2012.*

Nazaryan, T. A.; Petrosian, A. R.; Mclean, B. J., *Astrophysics, Vol. 55, No. 4, pp. 448-459, 2012.*

Sargsyan, L.; Gevorgyan, M.; Abrahamyan, H. V.; Kostandyan, G.; Paronyan, G.; Samsonyan, A.; Sargsyan, D.; Sinamyan, P., *Ap 55, p. 460, 2012.*

Weedman, D.; **Sargsyan, L.**; Lebouteiller, V.; et al., *Astrophysical Journal, Vol. 761, No. 2, article id. 184, 2012.*

Aramyan, L. S.; Petrosian, A. R.; **Hakobyan, A. A.**; …; **Nazaryan, T. A.,** *Astrophysics, Vol. 56, No. 2, p. 153-164, 2013.*

Gigoyan, K. S.; **Kostandyan, G.**; Sarkissian, A.; Russeil, D., *Astrophysics, Vol. 56, No. 2, pp. 267-270, 2013.*

Adibekyan, V. Zh.; Figueira, P.; Santos, N. C.; **Hakobyan, A. A.**; et al., *Astronomy & Astrophysics, Vol. 554, id.A44, 8 pp., 2013.*

Ghazaryan, S., *Advances in Astronomy and Space Physics, Vol. 3, p. 20-22, 2013.*

Harutyunian, H. A.; **Harutyunyan, V. S.,** *Astrophysics, Vol. 56, No. 3, pp. 359-369, 2013.*

Andreasyan, R. R.; Hovhannisyan, M. A.; **Paronyan, G. M.**; **Abrahamyan, H. V.,** *Astrophysics, Vol. 56, No. 3, pp. 382-394, 2013.*

Mickaelian, A. M.; **Abrahamyan, H. V.**; **Paronyan, G. M.**; **Harutyunyan, G. S.,** *AstronomischeNachrichten, Vol.334, No. 8, p. 887-891, 2013.*

Nazaryan, T. A.; Petrosian, A. R.; **Hakobyan, A. A.**; …; **Aramyan, L. S.,** *Astrophysics and Space Science, Vol. 347, No. 2, pp. 365-374, 2013.*

Ghazaryan, S.; Alecian, G.; Harutyunian, H., *Monthly Notices of the Royal Astronomical Society, Vol. 435, No. 3, p. 1852-1856, 2013.*

Hovhannisyan, M. A.; Andreasyan, R. R.; **Paronyan, G. M.**; **Abrahamyan, H. V.**, *NAS RA Reports, Vol. 113, No. 3, p. 281-289, 2013.*

Ter-Kazarian, G.; **Sargsyan, L.,** *Advances in Astronomy, Vol. 2013, id.710906, 2013.*

Morel, T.; Briquet, M.; Auvergne, M.; Alecian, G.; **Ghazaryan, S.**; et al., *Astronomy & Astrophysics, Vol. 561, id.A35, 14 p., 2014*

Nazaryan, T. A.; Petrosian, A. R.; **Hakobyan, A. A.**; et al., *Astrophysics, Vol. 57, No. 1, p. 14-29, 2014*

Nazaryan, T. A., *Astrophysics, Vol. 57, No. 1, p. 50-58, 2014*

Ghazaryan, S., *Astrophysics, Vol. 57, No. 1, p. 159-162, 2014*

Batista, S. F. A.; Adibekyan, V. Zh.; Sousa, S. G.; …; **Hakobyan, A. A.,** *Astronomy & Astrophysics, Vol. 564, id.A43, 4 p., 2014*

Sargsyan, L.; **Samsonyan, A.**; Lebouteiller, V.; et al., *Astrophysical Journal, Vol. 790, No. 1, article id. 15, 12 p., 2014*

Vardanyan, V.; Weedman, D.; **Sargsyan, L.,** *Astrophysical Journal, Vol. 790, No. 2, article id. 88, 12 p., 2014*

Nikoghosyan, E. H.; **Azatyan, N.,** *Astrophysics, Vol. 57, No. 3, p. 330-343, 2014*

Abrahamyan, H. V.; Andreasyan, R. R.; Hovhannisyan, M. A.; **Paronyan, G. M.,** *Astrophysics, Vol. 57, No. 3, p. 359-369, 2014*

Hakobyan, A. A.; **Nazaryan, T. A.**; Adibekyan, V. Zh.; Petrosian, A. R.; **Aramyan, L. S.**; et al., *MNRAS, Vol. 444, No. 3, p. 2428-2441, 2014*

Harutyunian, H. A.; **Harutyunyan, V. S.,** *Astrophysics, Vol. 57, No. 4, p. 484-490, 2014*

Gigoyan, K. S.; …; **Kostandyan, G.**; Vartanian, R.; **Abrahamyan, H. V.**; **Paronyan, G. M.,** *Astrophysics, Vol. 57, No. 4, p. 510-519, 2014*

Proceedings of Meetings (28)

Mickaelian, A.M.; Sarkissian, A.; **Sinamyan, P.K.,** *Proc. IAU Symp. 285, p. 366-368, 2012*

Melikian, N.D.; Tamazian, V.S.; Karapetian, A.A.**; Samsonyan, A.L.,** *International Workshop. AIP Conf. Proc., Vol. 1452, p. 73-79, 2012*

Ghazaryan, S.A.; Alecian, G.; Harutyunyan, H.A., *Proc. Conf. Young Scientists of CIS Countries, Yerevan: NAS RA, p. 77-80, 2012*

Rossi, C.; Gigoyan, K.S.;**Avtandilyan, M.G.**; Sclavi, S., *Proc. Conf. Young Scientists of CIS Countries, Yerevan: NAS RA, p. 94-97, 2012.*

Harutyunyan, G.S.; Mickaelian, A.M., *Proc. Conf. Young Scientists of CIS Countries, Yerevan: NAS RA, p. 157-161, 2012*

Paronyan, G.M.; Mickaelian, A.M., *Proc. Conf. Young Scientists of CIS Countries, Yerevan: NAS RA, p. 202-208, 2012*

Abrahamyan, H.V.; Mickaelian, A.M.; Knyazyan, A.V.; **Harutyunyan, G.S.**,*Proc. Conf. Young Scientists of CIS Countries, Yerevan, p. 223-229, 2012*

Gabrielyan, V.V., *Proc. Conf. Young Scientists of CIS Countries, Yerevan: NAS RA, p. 242-246, 2012*

Mickaelian, A.M.; **Abrahamyan, H.V.**; **Paronyan, G.M.**; **Harutyunyan, G.S.**,*Proc. IAU Symp. 284, Vol. 284, p. 237-239, 2012*

Hakobyan, A. A.; Petrosian, A. R.; Mamon, G. A.; et al., *Proc. IAU Symp. 281, p. 24-25, 2013*

Mickaelian, A. M.; **Sinamyan, P. K.**, *Proc. IAU Symp. 290, p. 275-276, 2013*

Mickaelian, A. M.; **Harutyunyan, G. S.**, *Proc. IAU Symp. 292, p. 159, 2013*

Mickaelian, A. M.; **Harutyunyan, G. S.**, *Proc. IAU Symp. 295, p. 182, 2013*

Ghazaryan, S., *EAS Publications Series, Vol. 63, 2013, pp. 411-413, 2013*

Mickaelian, A. M.; **Abrahamyan, H. V.**; **Harutyunyan, G. S.**; **Paronyan, G. M.**, *Proc. IAU Symp. 304, p. 41-42, 2014*

Harutyunyan, G. S.; Mickaelian, A. M.,*Proc. IAU Symp. 304, p. 68-69, 2014*

Abrahamyan, H. V.; Mickaelian, A. M., *Proc. IAU Symp. 304, p. 100-101, 2014*

Abrahamyan, H. V.; Mickaelian, A. M., *Proc. IAU Symp. 304, p. 102-103, 2014*

Andreasyan, R.; Hovhannisyan, M.; **Paronyan, G.**; **Abrahamyan, H.**, *Proc. IAU Symp. 304, p. 104-105, 2014*

Paronyan, G. M.; Mickaelian, A. M.; **Abrahamyan, H. V.**, *Proc. IAU Symp. 304, p. 161-163, 2014*

Paronyan, G. M.; **Abrahamyan, H. V.**; **Harutyunyan, G. S.**; Mickaelian, A. M., *Proc. IAU Symp. 304, p. 164-165, 2014*

Paronyan, G. M.; **Harutyunyan, G. S.**; Mickaelian, A. M., *Proc. IAU Symp. 304, p. 166-167, 2014*

Hovhannisyan, M.; Andreasyan, R.; **Paronyan, G.**; **Abrahamyan, H.,** *Proc. IAU Symp. 304, p. 236-237, 2014*

Nazaryan, T. A.; Petrosian, A. R.; **Hakobyan, A. A.**; McLean, B. J.; Kunth, D., *Proc. IAU Symp. 304, p. 327-330, 2014*

Hakobyan, A. A.; **Nazaryan, T. A.**; Adibekyan, V. Zh.; Petrosian, A. R.; **Aramyan, L. S.**; et al., *Proc.IAU Symp. 304, p. 339-340, 2014*

Nazaryan, T. A.; Petrosian, A. R.; **Hakobyan, A. A.**; …; **Aramyan, L. S.,** *Proc. IAU Symp. 304, p. 351-352, 2014*

Harutyunyan, G. S.; Mickaelian, A. M., *Proc. IAU Symp. 304, p. 383-384, 2014*

Harutyunyan, G. S.,*Proc. Archaeoastronomical Meeting, NAS RA "Gitutyun" Publishing House, p. 158-159, 2014*

Other Publications (3)

Hakobyan, A. A.; Adibekyan, V. Zh.;**Aramyan, L. S.**; et al., *VizieR On-line Data Catalog: J/A+A/544/A81*
Nazaryan, T. A., *Ph.D. thesis, Byurakan, 158 p., 2014*
Pozanenko, A.; Romas, E.; Nevskiy, V.; Ohanian, G.; **Andreasyan, H.**; et al., *GRB Coordinates Network, Circular Service, 16728, 1, 2014*

Missions by BAO young scientists in 2012-2014

Research Missions (23)

Satenik Ghazaryan	Paris, France	2 months	16.02-11.04.2012
Lusine Sargsyan	Cornell University, USA	7 weeks	10.04-31.05.2012
Artur Hakobyan	Paris, France	10 days	03.05-12.05.2012
Artur Hakobyan	Paris, France	2 weeks	01.11-15.11.2012
Levon Aramyan	Paris, France	4 weeks	01.11-28.11.2012
Tigran Nazaryan	Paris, France	2 weeeks	08.11-21.11.2012
Satenik Ghazaryan	Paris, France	3 months	23.04-20.07.2013
Anahit Samsonyan	Cornell University, USA	2 months	29.04-07.06.2013
Artur Hakobyan	Padua, Italy	2 months	01.05-30.06.2013
Artur Hakobyan	Paris, France	1 month	03.11-30.11.2013
Tigran Nazaryan	Paris, France	2 weeks	03.11-16.11.2013
Levon Aramyan	Paris, France	2 weeks	04.11-16.11.2013
Satenik Ghazaryan	Paris, France	2 weeks	04.11-19.11.2013
Levon Aramyan	Padua, Italy	1 week	17.11-24.11.2013
Satenik Ghazaryan	Brazil	1 week	20.11-27.11.2013
Vahagn Harutyunyan	Rome/Pescara, Italy	3 months	09.12.2013-28.02.2014
Knarik Khachatryan	Jena, Germany	2 weeks	10.04-25.04.2014
Ani Vardanyan	Jena, Germany	2 weeks	10.04-25.04.2014
Vazgen Gabrielyan	Germany	7 weeks	20.04-01.06.2014
Anahit Samsonyan	Cornell University, N.Y., USA	5 weeks	08.05-13.06.2014
Artur Hakobyan	IAP, Paris, France	2 weeks	01.06-15.06.2014
Satenik Ghazaryan	Paris, France	2 weeks	17.10-01.11.2014
Artur Hakobyan	Paris, France	2 weeks	09.11-22.11.2014

International Meetings (7)

Gurgen Paronyan	Pushchino, Russia	1 week	16.04-20.04.2012
Satenik Ghazaryan	Kiev, Ukraine	1 week	22.04-30.04.2012
Knarik Khachatryan	Kiev, Ukraine	1 week	22.04-30.04.2012
Ani Vardanyan	Kiev, Ukraine	1 week	22.04-30.04.2012
Levon Aramyan	Budapest, Hungary	1 week	02.09-08.09.2012
Gurgen Paronyan	Pulkovo Observatory, Russia	1 week	05.06-12.06.2014
Anahit Samsonyan	Beirut, Lebanon	1 week	01.09-09.09.2014

International Summer and Winter Schools (12)

Gohar Harutyunian	Switzerland	1 week	25.03-01.04.2012
Hayk Abrahamyan	Vatican	1month	31.05-01.07.2012
Gohar Harutyunian	Canary Islands, Spain	4 weeks	01.11-26.11.2012
Hayk Abrahamyan	Bucharest, Romania	1 week	23.09-30.09.2013
Gohar Harutyunyan	Bucharest, Romania	1 week	23.09-30.09.2013
Vahagn Harutyunyan	Bucharest, Romania	1 week	23.09-30.09.2013
Vahagn Harutyunyan	Nice, France	1 week	25.02-02.03.2014
Vahagn Harutyunyan	Les Houches, France	1 week	10.05-16.05.2014
Knarik Khachatryan	Rozhen Obs., Bulgaria	3 weeks	16.09-06.10.2014
Ani Vardanyan	Rozhen Obs., Bulgaria	2 weeks	24.09-06.10.2014
Gurgen Paronyan	Ak-Argali, Tajikistan	1 week	06.10-14.10.2014
Naira Azatyan	Chiang Mai, Thailand	3 weeks	24.11-12.12.2014

Lectures (3)

Gohar Harutyunyan	Stepanakert/Shushi, Artsakh	4 days	05.05-08.05.2013
Satenik Ghazaryan	Stepanakert, Artsakh	1 week	22.09-29.09.2014
Satenik Ghazaryan	Stepanakert, Artsakh	1 week	02.11-06.11.2014

Other Missions (3)

Levon Aramyan	Tbilisi, Georgia	3 days	26.09-29.09.2012
Tigran Nazaryan	Gwanju, Korea	1 week	16.10-24.10.2012
Vazgen Gabrielyan	Hartford, CT, USA	1 week	01.04-10.04.2014

Seminars by BAO young scientists in 2012-2014 *(9)*

18.06.2012, Byurakan — **Mkrtich Gevorgyan**: *Dust absorption in the AGN narrow-line region*
27.09.2012, Tbilisi, Georgia — **Levon Aramyan**:
05.11.2012, Byurakan — **Gurgen Paronyan**: *Multiwavelength studies of X-ray AGN*
13.11.2012, IAP, France — **Levon Aramyan**: *The association of different types of SNe with spiral structure of the host and star forming regions*
15.11.2012, IAP, France — **Levon Aramyan**: *On the nature of unconfirmed SNe*
29.07.2013, Byurakan — **Satenik Ghazaryan**: *Physical and chemical properties of HgMn stars*
10.03.2014, Byurakan — **Gurgen Paronyan**: *Current state of BAO plate archive and possible science projects*
26.05.2014, Byurakan — **Gurgen Paronyan**: *X-ray properties of galaxies*
16.06.2014, Byurakan — **Hayk Abrahamyan**: *Radio properties of AGN*

Grants and Awards by BAO young scientists in 2012-2014

RA SCS Research Thematic Grants 2013-2015

Artur Hakobyan, Tigran Nazaryan, Levon Aramyan (PI: A.R. Petrosian)
Davit Sargsyan (PI: T.Yu. Magakian)
Naira Azatyan (PI: E.H. Nikoghosyan)

RA SCS – France CNRS Joint Projects

2012-2013 **Artur Hakobyan, Tigran Nazaryan, Levon Aramyan** (PI: A.R. Petrosian)
2014-2015 **Satenik Ghazaryan** (PI: H.A. Harutyunian)

Armenian National Science & Education Fund (ANSEF)

2012 **Hayk Abrahamyan, Gurgen Paronyan, Gohar Harutyunyan** (PI: A.M. Mickaelian)
2013 **Artur Hakobyan** (PI)
2014 **Artur Hakobyan** (PI)
2014 **Hayk Abrahamyan, Gurgen Paronyan** (PI: A.M. Mickaelian)
2015 **Levon Aramyan** (PI)

ArAS Annual Prize for Young Astronomers (Yervant Terzian Prize)

2012 **Vardan Adibekyan**
2013 **Hayk Abrahamyan** and Avet Harutyunyan
2014 **Gurgen Paronyan**

Galileo Teachers Training Program (GTTP) Certificates

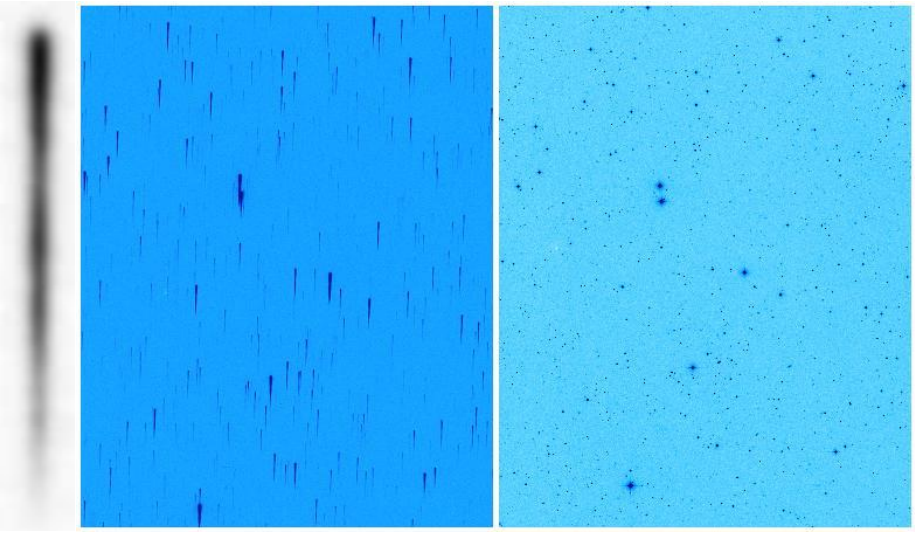
2012 **Tigran Nazaryan**

BAO PLATE ARCHIVE PROJECT KICK-OFF

A.M. Mickaelian, H.V. Abrahamyan, H.R. Andreasyan, N.M. Azatyan, S.V. Farmanyan, K.S. Gigoyan, M.V. Gyulzadyan, K.G. Khachatryan, A.V. Knyazyan, G.R. Kostandyan, G.A. Mikayelyan, E.H. Nikoghosyan, G.M. Paronyan, A.V. Vardanyan

A project on **Digitization of Byurakan Astrophysical Observatory (BAO) Plate Archive and creation of BAO Interactive Astronomical Database** (shortly BAO Plate Archive project, BAO PAP) has started in February 2015. It is aimed at preservation of BAO valuable observational material accumulated during 1947-1991, creation of full Database of all BAO observations, creation of BAO Interactive Sky Map with visualization of all observations and quick access to the data, development and accomplishment of new research projects based on the existing observational material, and integration of BAO observations into the international databases. A number of BAO young astronomers are involved in this project and it will last 3 years.

BAO Plate Archive is one of the largest astronomical archives in the world and is considered to be BAO main observational treasure. Taking into account decades hard work of Armenian astronomers and the work of BAO telescopes and other expensive equipment, as well as the results of their activities, one can say that BAO Plate Archive is one of our national scientific values. Due to Viktor Ambartsumian's brilliant ideas and the mentioned observational work, RA Government has recognized BAO as National value.Today BAO archive holds some 37,000 astronomical plates, films or other carriers of observational data. However, previous observational and informational registration methods currently do not make it available to wide range of scientists, and especially its usage for solution of new research problems.



BAO observers worked with a number of BAO telescopes during 1947-1991 and obtained several dozens of thousands plates, films and other products. The table gives general understanding on observations of 10 BAO telescopes that worked on photographic photometry, electrophotometry, slit and objective prism spectroscopy, and polarimetry of many thousands astronomical objects.

Telescope name	Size (cm)	Years	Observ. methods	Plates
5" double-astrograph	13	1947-1950	photometry	3000
6"	15	1947-1950	photometry	3000
8" Schmidt	20/20/31	1949-1968	photometry	4500
20" Cassegrain	51/800	1952-1991	electrophotometry	
10" tel.-spectrograph	25	1953-	spectra	
nebular spectrograph		1954-	spectra	
16" Cassegrain	41/400	1955-1991	electropolarimetry	
21" Schmidt	53/53/183	1955-1991	photometry	12000
40" Schmidt (AZT-10)	102/132/213	1960-1991	photom., spectra	7500
ZTA-2.6m	264/1016	1975-1991	photom., spectra	7000
All telescopes		**1947-1991**		**37000**

The digitization of astronomical plates and films pursues not only the maintenance task, but also it will serve as a source for new scientific research and discoveries, if only the digitized material runs according to modern standards and, due to its accessibility, it will become an active archive. The project is aimed at compilation, accounting, digitization of BAO observational archive photographic plates and films, as well as their incorporation in databases with modern standards and methods, providing access for all observational material and development of new scientific programs based on this material.

Scientific Programs Board (SPB) is created to evaluate the existing observational material, to select sets of priorities to be scanned first and to propose new research projects. It consists of BAO Director **Haik Harutyunian** and most experienced BAO observers: **Kamo Gigoyan**, **Tigran Magakian**, **Norair Melikian**, **Areg Mickaelian**, **Tigran Movsessian**, **Elena Nikoghosyan**, **Elma Parsamian**, **Artashes Petrosian**, as well as **Vladimir Sahakyan** and **Hrachya Astsatryan** from NAS RA Institute of Informatics and Automation Problems (IIAP) are involved for their experience in computer science related to databases and computational methods. SPB 1st meeting was held on 23 Feb 2015. Haik Harutyunian and Areg Mickaelian presented the details of the Project, all the members discussed possible science programs based on digitized material.

Project Executing Team (PET) consists of 14 members: **Areg Mickaelian** (Project Manager, SPB Coordinator), **Elena Nikoghosian** (Deputy Manager on Administrative Issues, SPB member), **Kamo Gigoyan** (Deputy Manager on Technical Issues, SPB member), **Gurgen Paronyan** (Person in charge for BAO Plate Archive, PET member), **Hayk Abrahamyan**, **Naira Azatyan**, **Hasmik Andreasyan**, **Marietta Gyulzadyan**, **Knarik Khachatryan**, **Gayane Kostandyan**, **Ani Vardanyan** (PET members), **Gor Mikayelyan** (Database Manager, Web Designer), **Sona Farmanyan** (Webpage content, dissemination, outreach, and organizational issues) and **Aram Knyazyan** (NAS RA IIAP, Database Manager).

PET meetings were held on 2 and 9 March 2015 to organize the project, present work packages, and distribute responsibilities. DFBS and other previous digitization projects were discussed to get experience of similar works and apply all this to the present Project.

Following works were done during February-April 2015:

- Technical principles of the Project, necessary Equipment, Timeline and the Budget have been developed,
- SPB was created and its 1st meeting was held,
- PET was created and 2 PET meetings were held in March,
- EPSON Perfection V750-M Pro scanner and 2 PCs with 24" monitors were ordered (a similar scanner is present at BAO from the previous projects),
- BAO Director has instructed about the collection of the rest of photographic plates from BAO staff members (until recently only plates obtained before 1974 had been collected in BAO Plate Archive),
- Revision and accounting of the plates and observing journals in BAO Plate Archive were started,
- Repair works of BAO Plate Archive were started,
- In BAO Administrative building, in ArVO office, two temporary working places were equipped to start the project,
- A few dozens of plates were scanned for test and educational reasons to set up the necessary parameters for the scanning in frame of the main Project,
- Accounting and collection of the plates in BAO New Laboratory building were started,
- Input of data from observing journals was started,
- Preparatory works on creation of the Project Database were started and the principles of the organization of data in it were developed,
- Preparatory works on creation of the Project Webpage were started and the information part of the webpage was created.

BAO PAP webpage was recently open and contains a lot of information on BAO observations, previous digitization projects, present Project details, teams, follow-up research projects, deliverables and related links (many items will be filled in during the next months). **"BAO Observations"** contain data on BAO telescopes, observers, observing programs accomplished during 1946-1991, publications based on BAO observations, and presents BAO Plate Archive organized in 1986. **"Digitization Projects"** present previous digitization projects, including DFBS (digitized Markarian Survey), Second Byurakan Survey (SBS), FBS

Blue Stellar Objects spectroscopy and Variability of ON 231. **"Project Description"** gives Project Tasks, Instruments and Methods, and Timeline. **"Project Teams"** presents SPB and PET with links to their personal webpages. **"Follow-Up Projects"** is the list of possible follow-up research projects that may be carried out based on the digitized data. **"Deliverables"** will be regularly updated with publications, presentations, reports, project related meetings, press-releases and mass media news concerning BAO PAP. **"Related Links"** give links to BAO, Wide-Field Plate Data Base (WFPDB), IAU Working Group on Preservation and Digitization of Photographic Plates (PDPP), DFBS, Armenian Virtual Observatory (ArVO), International Virtual Observatory Alliance (IVOA), digitization projects in other countries and observatories, related software, etc.

However, the main products will be **"Data Access"** and **"Interactive Sky Map"**. The first one will contain BAO Observational Database, Search by any parameter (Dates/ Julian dates, Telescope, Observing modes/methods, Instrument, Receiver, Emulsion, Filters, Seeing, Project name, Project PI, Observers, Targets / coordinates, Sky area, Surface, Scale, Spatial resolution, Spectral range, Spectral resolution, Limiting magnitude, Number of nights, Number of exposures, Links), Data Visualization and Download of the digitized plates, films, part of them or individual objects images or spectra. "Interactive Sky Map" will visualize the observed by BAO telescopes sky and will give possibility to check observed areas for a given observational project, given telescope, observer, observing method, limiting magnitude, etc. There will be possibility to check individual fields for presence and number of plates to propose further research projects. Main expected projects are supposed to be those on variability and proper motions, as well as studies of the Solar System objects.

BAO PAP webpage is available at http://www.aras.am/PlateArchive/

NAS RA GENERAL ANNUAL MEETING AND ARMENIAN ASTROPHYSICISTS

On the 3rd of April 2015, at the National Academy of Sciences of the Republic of Armenia (NAS RA) was held the General Meeting of NAS RA. NAS RA President Academician Radik Martirosyan made an opening speech and reported on the main results of research activities of the Academy for 2014. Hrant Matevosyan, NAS RA Academician-Secretary and Corresponding Member, delivered a report on scientific-organizational activities of the Academy for 2014. At the Annual meeting, the report entitled *"The Legal and Political Problems of the Recognition of the Armenian Genocide"* was presented, which was prepared by NAS RA Academicians Gagik Ghazinyan, Ashot Melkonyan and Ruben Safrastyan.

On the 2nd of April, the Annual General Meetings of NAS RA Divisions was held. Among the participants, newly elected NAS RA foreign members by specializations related to Astronomy and Astrophysics were also present and gave talks. ***Dr.*** **Razmick Mirzoyan** gave a talk on *"The technique and recent achievements of the groundbased very high energy gamma-ray astrophysics by means of imaging atmospheric Cherenkov telescopes"*, ***Prof.*** **Armen Sedrakian** gave a talk on *"The densest forms of matter in our Universe"* and ***Dr.*** **Varoujan Gorjian** gave a talk on *"Variability in Active Galactic Nuclei"*.

Two of them, *Dr*. Varoujan Gorjian and *Dr*. Razmick Mirzoyan also visited BAO on the 7th of April and gave seminars on *"Spitzer Space Telescope and Results on AGN Studies"* and *"Very High Energy Astrophysics and Current Research Projects"*, respectively.

Short biographies of these foreign members follow:

Dr. Varoujan Gorjian is PhD in Astronomy and Astrophysics and a researcher of NASA's Jet Propulsion Laboratory (JPL, USA). He graduated from the California Institute of Technology (Caltech) and University of California, Los Angeles (UCLA). His research is focused on infrared galaxies and active galactic nuclei.

Dr. Razmick Mirzoyan is a specialist of High Energy Astrophysics. He is the Head of MAGIC group at Max-Planck-Institute for Physics (MPIP) and MAGIC Telescope Project Manager, leading specialist and speaker of international Taiga cooperation, Professor of Irkutsk State University (ISU, Russia) and the head of the laboratory of ISU Multi-TeV Energy Gamma-Ray Astronomy.

Prof. Armen Sedrakian is a specialist of theoretical physics and astronomy. He is a researcher at the Institute for Theoretical Physics at the University of Frankfurt-am-Main. Much of his research is focused on understanding the physics of superfluidity and superconductivity in neutron stars, nuclear matter, quark matter and ultra-cold atoms.

Dr. Gorjian's interview will appear in the next issue of ArASNews.

Prof. Sedrakian's interview in Armenian is available at:
http://168.am/2015/04/19/480773.html

Here we reprint **Dr. Mirzoyan's** interview given to *Eleni Chatzichristou* (APPEC Communications Office)

You are Project Leader and Spokesperson for the MAGIC collaboration. What are the major goals and research directions of the collaboration?

The Imaging Atmospheric Cherenkov Technique (IACT) has made giant steps - in fact it became a powerful new branch of astrophysics. With the discovery of very high energy (VHE) gamma rays from the Crab Nebula in 1989, the Whipple team laid the foundation for the new science. Other telescope installations, like HEGRA and CANGAROO, belonging to the so-called 2nd generation IACTs, very soon started their own search of gamma ray sources. Although some 10 sources were discovered by the year 2000, still all of those detections were made above the energy threshold of ~300 GeV.

Already in 1995, at a few conferences, we had presented the concrete concept of the 17m diameter MAGIC telescope. Shortly before we had understood that the energy threshold of detection ($E_{threshold}$) was inversely proportional to the area of the mirror ($1/\sqrt{A_{mirror}}$) and not the square root of the area as is the case for non-imaging telescopes, showing thus that one can build a moderately large diameter telescope for operating in the domain of sub-100 GeV energies.

The MAGIC design was aiming to go towards the sub- 100 GeV energy range down to 30-40 GeV, into the last decade, "terra incognita" of the electromagnetic emission spectrum, traditionally considered as the classical domain of satellite-born instruments. MAGIC people were anticipating finding new classes of sources such as, for example, the pulsars. Also, because of strong absorption of TeV gamma-rays by the extragalactic background light, MAGIC was aiming to measure sources in the sub-100 GeV range, where the universe is much more transparent to gamma rays and one can search for powerful sources located at large redshifts.

We have spent a lot of effort planning the telescope to be light-weight, for fast repositioning of the telescope in response to the alerts os satellites spotting Gamma Ray Bursts, trying to measure them still in the prompt phase of the emission. For that purpose we built the reflector of the telescope from reinforced carbon fibre, which is several times lighter than the steel but has a comparable stiffness and very low thermal expansion. For the same reason we introduced the concept of the Active Mirror Control to the VHE Gamma Astrophysics, allowing one to counteract the deformations of the reflector due to varying gravitational loads when tracking sources.

Today we are happy that our expectations were largely fulfilled. In 2008 we found the first pulsed signal from the Crab pulsar at energies above 25 GeV, for the first time creating a bridge between satellite detectors and IACTs. Recently we found that the spectrum of the pulsating gammas from Crab is extending till ~2 TeV, i.e. that an object of a ~ 10km size can accelerate electrons to a gamma factor of ~ 10^7. By using the data of the Fermi satellite and of MAGIC we measured very precisely the peak position of ~ 55 GeV of the Inverse Compton emission of the Crab Nebula. Recently, via gravitational lensing, we found the new source S3 0218 located at a redshift of almost 1 (z=0.944). The list of highly interesting results, both of extragalactic and galactic origin, is really long and it is progressively updated with newer results.

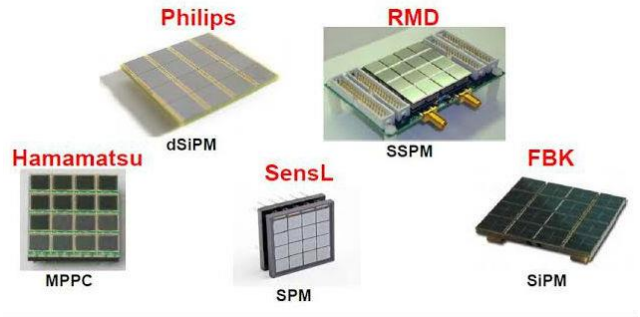
Could you give a brief overview on light sensor technology used in astroparticle physics?

The classical photomultiplier tubes (PMTs) are the main detectors used as light sensors in astroparticle physics experiments. In a dedicated two-stage development program (at first for MAGIC and since 2010 for the CTA collaboration), in tandem with industrial partners Hamamatsu (Japan) and Electron Tubes Enterprises (England), we succeeded to significantly improve the performance of PMTs. Today we arrived at 1.5 inch size commercial PMTs for the CTA project, which have an average peak quantum efficiency (QE) of ~40%, photo electron collection efficiency in excess of 95%, and about 50 times reduced after-pulsing. Now these are the best PMTs worldwide. We anticipate that these novel technologies will be applied also to the large size PMTs, much needed in neutrino experiments.

Silicon photomultipliers (SiPMs) emerged as novel photo sensors some 15 years ago. In 2003 we suggested to use them in astroparticle physics experiments, initially in EUSO and in MAGIC, and actively participated in their development. Some seven years ago we started constructing realistic pixels for IACTs. This initiative has been taken by our colleagues from the FACT collaboration that succeeded constructing a full-scale operational camera. My colleagues from the CTA collaboration are planning to use SiPMs for the cameras of the so-called small size telescopes (~4m diameter class) as well as for the mid-size Schwarzschild-Couder telescope. The parameters of SiPMs are still improving, every 6-8 months we face novel and better products from several manufacturers. For the time being the best SiPM samples come close to the parameters of the best PMTs. The SiPMs have the potential to achieve a photon detection efficiency (PDE) of ~60-65% at an acceptable low cross-talk level of a few percent; this may be within reach within the next couple of years. The SiPMs have a small size of typically 3mm×3mm or 6mm×6mm. The limitation on the size is due to the requested fast timing of a few nanoseconds, as well as, due to the increasing with size gain and cross-talk. Currently a few groups are trying to build close-packed matrixes of SiPMs for emulating PMTs of 1-1.5 inch size, but the results still need to be carefully evaluated.

What are the main innovations/technological improvements in the use of light sensors in astroparticle physics?

Since the mid 1960's the main parameters of PMTs were stagnating for about 40 years. The main innovation in light sensors in the past 10 years are related to the enhancement of their photon detection efficiency and the suppression of the unwanted after-pulsing in PMTs and cross-talk and after-pulsing in SiPMs. About 10 years ago the typical PMT had a peak QE of ~25%, photo-electron collection efficiency of 80% and an after-pulsing level of 0.5% for the set threshold of 4 photo electrons. Today we have PMTs with peak QE in excess of 40%, photo electron collection efficiency of 95-98% and an after-pulsing below 0.01%.



A faster improvement can be observed for SiPMs. While SiPMs from Hamamatsu, named MPPC (multi-pixel photon counter), were showing a peak PDE of 30-35% ~5 years ago, today there are devices with a peak PDE of ~45%. But for the majority of experiments the PDE of SiPMs alone is not a very meaningful parameter; one needs to consider the cross-talk and the after-pulsing levels for understanding the limitations in the aimed application. Today SiPM samples from several manufacturers show cross-talk at a several percent level; this is to be compared with their one order of magnitude higher level in the relatively recent past.

Today SiPM cost is becoming progressively low. This is unfortunately not the case for the readout systems. For planning an astroparticle physics detector one needs to carefully consider costs. Even with comparable photon detection efficiencies of SiPMs and PMTs, simply substituting the PMTs by assembled matrixes of many SiPMs may not necessarily offer an optimal solution. In addition, the assembled matrixes of SiPMs may not be as fast as the PMTs; also, it is well known that even a single SiPM has a significantly higher noise rate than a PMT. But as I mentioned earlier, the SiPM parameters are still improving and when their PDE will exceed that of PMTs by ~50%, they may become very strong competitors for PMTs, albeit only for small sensor size applications.

What are the technological advances in ground-based gamma-ray astronomy? And what are the upcoming plans?

The technological advances in ground-based gamma-ray astronomy are multi-fold, they can be observed taking as an example the (differing in size and performance) telescopes of the CTA collaboration:

1. Use of novel technologies for mirror production providing longevity (mirrors currently used for IACTs are strongly deteriorating after ~3 years).
2. The Active Mirror Control System finds wide application in large-size telescopes. This provides optimal focusing of telescopes independent on observation angles.
3. Novel readout systems in the imaging cameras provide an order of magnitude lower cost compared to what was used just a few years ago.
4. We are moving towards sealed, temperature-controlled imaging cameras; this is necessary for the desired robotic operation of the telescopes in the future and for the reduced maintenance of multiple telescopes in high-mountain altitude or desert locations.
5. Double-mirror telescope designs are paving the road. They are using SiPM-based cameras, offer a compact design for a wide field of view and promiss an improved angular resolution. The main challenges here are related to the secondary mirror which needs high precision both in quality and fixation in the structure. The first ASTRI telescope of the Italian INAF was inaugurated in Sicily in September 2014. Probably within a time scale of a year we will have results from the first measurements. The main problem with the double-mirror designs, compared to simple prime focus telescopes, is their high cost.

Speaking about future plans, I believe that the last word in the scene of light sensors is not yet said, not only the SiPM but also the PMT parameters can still be improved significantly. I am part of a small community of photo-cathode-related specialists-enthusiasts who are dreaming about a PMT with peak QE as high as maybe 70% (for the time being we have few samples of 45-47%). For me, this is essentially linked to the question of availability of financial resources and coordinated efforts of a few years.

You are heading Russian-German collaboration at Tunka Valley, operating a large-scale experiment studying cosmic rays and gamma-rays. Could you say something about this project and its expected outcomes?

The experiment dubbed as TAIGA in Tunka valley, near the lake Baikal, is really interesting. Currently TAIGA has an operational 185 station TUNKA open-air-integrating Cherenkov detectors. An underground muon detector is under construction for vetoing muons. The experiment is hosting an array of radio detectors from our colleagues from Karlsruhe.

Our idea is to try to operate a single small-size, wide-angle imaging Cherenkov telescope together with the wide-angle integrating Cherenkov detectors (dubbed HiSCORE), which (initially) will be spread over a distance of ~600 m from the telescope. This combination can be considered as a “cell” of a future large-size instrument. Since some time now, the concept of HiSCORE, along with that of the imaging telescope, is pursued by my colleagues from the University of Hamburg and DESY (from Hamburg and Zeuthen locations), together with experienced research teams from MEPhi, SINP MSU, ISU and JINR Dubna in Russia. The combination of a low-coat wide-angle imaging Cherenkov telescope with the so-called HiSCORE detectors, spread over large distances, has the promise to offer very large collection area for measuring the spectra of tens of TeV to hundreds of TeV gamma-ray sources (so called PeVatrons). Compared to planned alternatives, this is a really low-cost detector. We will try to prove this principle in the coming years. Some 30 HiSCORE stations are now operational and the first imaging telescope is under construction.

SEAC ANNUAL MEETING 2015

Astronomy in Past and Present Cultures

9 - 15 November 2015, Rome, Italy

FIRST ANNOUNCEMENT

The European Society for Astronomy in Culture (SEAC; web site http://www.archeoastronomy.org/) is a professional association of scientists working in the field of Cultural Astronomy, including the interdisciplinary fields of Archaeoastronomy and Ethnoastronomy. In principle, past cultures should have been interested in all astronomical phenomena visible to the naked eye. However, it is obvious that some of these phenomena are so evident and linked to vital factors that it is difficult to believe they were ignored in any cultural context. The term "Archaeoastronomy" is currently used to define the studies concerning "what peoples throughout history and prehistory have made of the phenomena in the sky, how they used these phenomena and what role they played in their cultures" (Sinclair 2006), while Ethnoastronomy concerns the study of the influence of celestial phenomena on present day population folklore. To date, Archaeoastronomy, Ethnoastronomy and Historical Astronomy (the studies dedicated to recovering data of astrophysical interest from historical documents of pretelescopic epoch, i.e. before the 17th century AD) are grouped as "Cultural Astronomy". However, researchers in nearby fields of science like History of Astronomy and Mythology are also welcomed in SEAC conferences. Furthermore, the present day cultures are also strongly influenced by astronomy: we will be glad to discuss also about these relationships.

SCIENTIFIC ORGANIZING COMMITTEE (SOC)

Vito Francesco Polcaro (Inst.Space Astrophys. & Planetology, INAF & ACHe Centre, Ferrara Univ.), ***Chair***
Elio Antonello (INAF, Osservatorio Astronomico di Brera)
Juan Antonio Belmonte (Instituto de Astrofisica de Canarias)
Giovanni Bignami (IUSS, Pavia, INAF President)
Mary Blomberg (University of Stockholm)
Roberto Buonanno (University of Rome-Torvergata, SAIt President)
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Manuela Incerti (Director ACHe Centre, Ferrara University)
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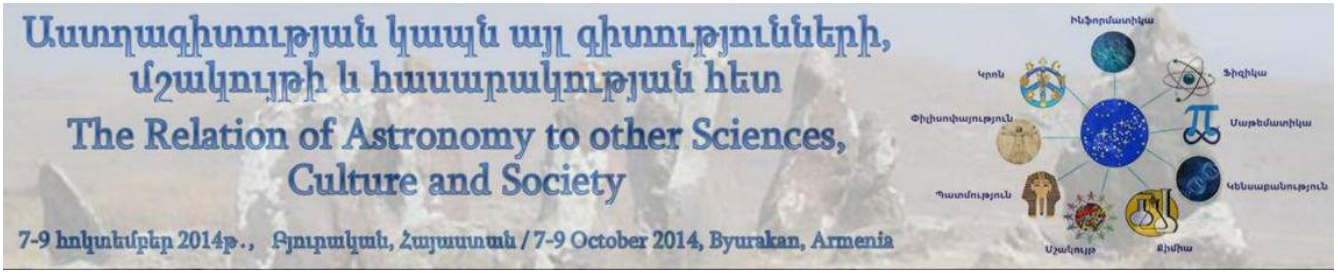
Lucio Lombardi Satriani (Rome University "La Sapienza")
Giulio Magli (Milan Polytechnic)
Davide Nadali (Dept. of Classics, Rome University "La Sapienza")
Andrea Polcaro (Dept. of Humanities, Perugia University)
Michael Rappenglück (INFIS, Gilching bei München, SEAC President)
Marianna Ridderstad (University of Helsinki)
Lionel Sims (University of East London)
Lorenzo Verderame (Istituto Italiano di Studi Orientali, Rome University "La Sapienza")

"RELATION OF ASTRONOMY TO OTHER SCIENCES, CULTURE AND SOCIETY"
MEETING ABSTRACTS

The meeting ***"Relation of Astronomy to other Sciences, Culture and Society"*** took place on 7-10 October 2014 in Byurakan, Armenia. It was unique by its coverage of various fields of science and culture related to astronomy and/or inter- and multidisciplinary sciences. The **Proceedings** will soon be published by the National Academy of Sciences of the Republic of Armenia (NAS RA) *"Gitutyun" Publishing House*. For wider promotion here we give English abstracts of the contributions, which will also appear in Astrophysical Data System (ADS). Abstracts are sorted by the Sessions and the order of presentation at the meeting.



Session *Introductory*

Astronomy as the Leader of Interdisciplinary and Multidisciplinary Sciences

Radik Martirosyan[1], **Areg Mickaelian**[2]

1 – National Academy of Sciences of the Republic of Armenia (NAS RA)

2 – NAS RA V. Ambartsumian Byurakan Astrophysical Observatory (BAO)

Interdisciplinary and multidisciplinary sciences over the last few decades have become the major booster of science development. The most important discoveries occur just at the intersection of sciences and in collaboration of several fields. There appeared such intermediate fields as mathematical physics, physical chemistry, biophysics, biochemistry, geophysics, etc. In astronomy, astrophysics has long been the main field, and in present archaeoastronomy, Astrochemistry, Astrobiology, Astroinformatics (which is tightly related to virtual observatories) are developing. On the other hand, in recent years many science areas surfeit of research on Earth, more and more use data coming from the Space and are being developed just due to them. It is possible that in the near future, various science areas create Space departments or simply develop their research in close collaboration with astronomers. Interesting discoveries have been made in studies of astronomical topics in various areas of culture; such topics are widely used in folklore, other genres of literature, painting, and architecture. Astronomy has also a leading role in scientific tourism, scientific journalism and in general, dissemination of popular science or public outreach.

Session *Astronomy & Philosophy*

Philosophical aspects of Space Science

Gevorg Poghosyan
NAS RA Institute of Philosophy, Sociology and Law

The modern astronomy and physics are closely related to the philosophy. If in the past philosophy was largely confined to interpretations of the results obtained by the natural sciences, in the present times it becomes a full member of the scientific research process. Philosophy is currently involved not only in the methodological problems of the natural sciences and formulation process of the general conclusions. In most cases, the philosophical considerations are allowed to make a choice between the different physical hypotheses and assumptions. A unified approach to solving the problems of philosophy and natural sciences becomes more important as the physical and philosophical aspects are often intertwined, forming a mold that defines our knowledge of today's leading edge.

Ancient Cosmology, superfine structure of the Universe and Anthropological Principle

Hrant Arakelyan
NAS RA Institute of Philosophy, Sociology and Law

The modern cosmology by its spirit, conception of the Big Bang is closer to the ancient cosmology, than to the cosmological paradigm of the XIX century. Repeating the speculations of the ancients, but using at the same time subtle mathematical methods and relying on the steadily accumulating empirical material, the modern theory tends to a quantitative description of nature, in which increasing role are playing the numerical ratios between the physical constants. The detailed analysis of the influence of the numerical values of physical quantities on the physical state of the universe revealed amazing relations called fine and hyperfine tuning. In order to explain, why the observable universe comes to be a certain set of interrelated fundamental parameters, in fact a speculative anthropic principle was proposed, which focuses on the fact of the existence of sentient beings.

Ideological basis of the Neobyurakanian Cosmogony

Samvel Poghosyan
"Armon" Research Centre, Georgia

Abstract is not available.

The absence of gravitational waves and the question of the basis of Relativistic Cosmology

Robert Djidjian
Kh. Abovyan Armenian State Pedagogical University (ASPU)

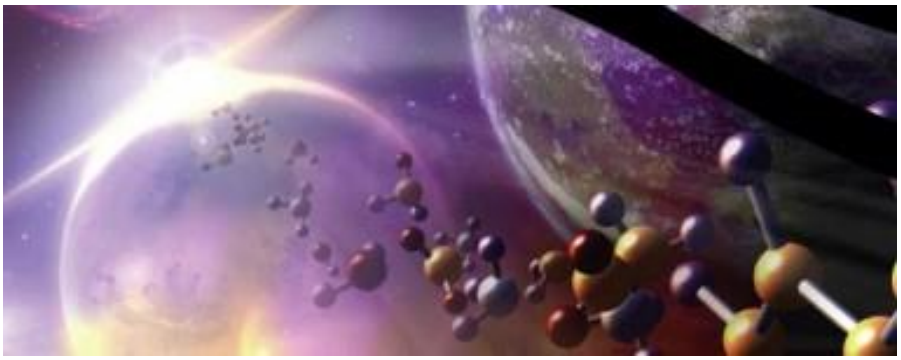
Abstract is not available.

Gnoseological and epistemological aspects of Space Science

Alexandr Manasyan
Yerevan State University (YSU)

In a formula *"If knowledge is true, it is true objectively"* widely spread in philosophical literature is reflected the perception of traditional gnoseology about relations of truth and inter-scientific characteristics of knowledge. In a monograph *"Methodological principles of scientific knowledge and problem of unity of science"* (Yerevan, 2002, in Russian) we have tried to justify the thesis according to which objectivity may be concluded from truth as a final product of scientific cognition, is not appropriate to a real process of scientific cognition. We contapose to it another formula: *"the train of cognition for reaching to the station of truth passes through station of objectivity"*. The grand debates of history of cosmology have rich material that overcoming of subjective component of knowledge is a way to reach merit of objectivity. This is the way through which the cognition progresses to truth. In this sense, "Ptolemy-Copernicus" and "Einstein-Lorenz" debates are of special interest. The role of inter-scientific regulators of causality, simplicity, invariance and the role of other regulators of objectivity ensure objectivity of knowledge. Furthermore, proposed approach allows demarcating *gnoseology* and *epistemology* as disciplines about process of cognition.

Session *Astrobiology*



Was the Universe always a convenient place for the origin of life?

Ararat Yeghikyan
NAS RA V. Ambartsumian Byurakan Astrophysical Observatory (BAO)

It was claimed that at least certain stages of the process by which life originated occurred in space, hence there is a strong interest in the range of organics in ice-rich structures in interstellar dense molecular clouds (MC) that may have contributed the precursors of life. The combination of the astronomical data regarding star-forming regions with published experimental results of energetic particle and ultraviolet (UV) processing of ices with our theoretical modelling will help estimating the contribution of the cosmic rays (CR) and UV irradiation to the changes in dust grains in the dense MC. From astrobiology's point of view, an area of rapidly growing interest, it seems important to understand the mechanisms by which large molecules, possibly of pre-biotic interest like heavy hydrocarbons and amino acids could be formed by UV and CR processing of chemically simpler solids in the environment of the clouds. If it turned out that such conversions depended, for example, on star formation efficiency not only in the cloud given, but also in the Galaxy as a whole, including a time-dependent rate over the Galaxy life, then these results would have interesting implications for astrochemistry and astrobiology. My conclusion is that the life origin is limited not only in space, where the Solar System is located, but also in time, when its precursor molecular cloud was originated, about 6-7 billions years ago.

The Problem of Extraterrestrial Civilizations and Extrasolar Planets

Areg Mickaelian
NAS RA V. Ambartsumian Byurakan Astrophysical Observatory (BAO)

The problem of extraterrestrial intelligence is the best example of multidisciplinary science. Here philosophy and religion, astronomy, radiophysics, spectrography, space flights and astronautics, geology and planetology, astroecology, chemistry and biology, history and archaeology, psychology, sociology, linguistics, diplomacy, UFOs and peculiar phenomena are involved. Among these many-sided studies, astronomers have probably displayed the most progress by discovering thousands of extrasolar planets. At present, a number of search programs are being accomplished, including those with space telescopes, and planets in so-called "habitable zone" are considered as most important ones, for which various orbital and physical parameters are being calculated. As the discovery of extraterrestrial life is the final goal, a special attention is given to Earth-like planets, for the discovery of which most sensitive technical means are necessary.

Analogies of the Astronomy and Biological Models

Ruben Hakobyan (Tarumian)

Some analogies between the stars' evolution models and evolution of the Biosphere, allow propose a hypothesis about the possibility of finding a periodical regular pattern of alternation of biological attributes. Such a consistent pattern will enable to use mathematically relatively well-developed methods of astronomy, for promoting the development of biology.

An Application of the Cosmologic Concepts and Astronomical Symbols in the Ancient Medical Science and Astrology Systems

Hovhannes Pikichyan
NAS RA V. Ambartsumian Byurakan Astrophysical Observatory (BAO)

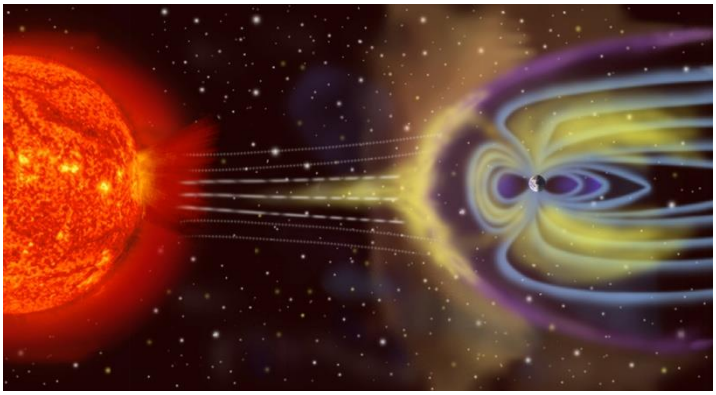
Employing the cosmologic concepts and astronomical symbols, the features of the ancient subjective approach of the achievement or perception of the knowledge and its systematic delivery ways are presented. In particular, the ancient systems of the natural medical science and the art of astrology are discussed, whereas the relations of the five cosmological elements, three dynamical agents, nine luminaries and twelve zodiac signs are applied. It is pointed out some misunderstandings encountered in the contemporary interpretation on the evaluation of ancient systems of the knowledge.

Observation of Astronomical Phenomena by Non-Traditional Methods

R. Sargsyan, **Gagik Karamyan**, A. Manukyan, A. Nikoghosyan, V. Vardanyan
NAS RA Institute of Physiology

The background signals of «Bioscope» device developed by us are analyzed. Long time round-the-clock observations carried out simultaneously by four identical devices have revealed the reliable sharp changes of signals which coincide with high accuracy with the time of rise and set of Sun and Moon. There are presented the measurements results and a hypothesis explaining these phenomena.

Session *Space-Earth Connections*



Detrimental Effects of Extreme Solar Activity on Life on Earth

Vladimir Airapetian, Alex Glocer, Charles Jackman
NASA Goddard Space Flight Center (GSFC), USA

Solar Coronal Mass Ejections (CMEs), the most energetic eruptions in the Solar System, represent large-scale disturbances forming with the solar corona and are associated with solar flares and Solar Energetic Particles (SEP) events. Current Kepler data from solar-like stars suggest that the frequency of occurrence of energetic flares and associated CMEs from the Sun can be as high as 1 per 1500 years. What effects would CME and associated SEPs have on Earth's habitability? We have performed a three-dimensional time-dependent global magnetohydrodynamic simulation of the magnetic interaction of such a CME cloud with the Earth's magnetosphere. We calculated the global structure of the perturbed magnetosphere and derive the latitude of the open-closed magnetic field boundary. We used a 2D GSFC atmospheric code to calculate the efficiency of ozone depletion in the Earth's atmosphere due to SEP events and its effects on our society and life on Earth.

Astronomy and Astronautics

Avetik Grigoryan
Space Club of the Technical Creation Republican Centre of the Ministry of Education and Science

Astronomy and Astronautics are presented as fundamental areas of human activity in science and technology. It is shown how closely these areas are interlinked, how each of them contributes to the development of the other and what radical and global role they had together in shaping the modern world.

Dangerous Near-Earth Asteroids and Meteorites

Areg Mickaelian[1], Avetik Grigoryan[2]
1 – NAS RA V. Ambartsumian Byurakan Astrophysical Observatory (BAO)
2 – Space Club of the Technical Creation Republican Centre of the Ministry of Education and Science

The problem of Near-Earth Astreoids (NEOs) and meteorites is discussed. To have an understanding on the probablity of encounters with such objects, one may use two different approaches: 1) historical, based on the statistics of existing large meteorite craters on the Earth, estimation of the source meteorites size and the age of these craters to derive the frequency of encounters with a given size of meteorites and 2) astronomical, based on the study and cataloging of all medium-size and large bodies in the Earth's neighbourhood and their orbits to estimate the probability, angles and other parameters of encounters. Therefore, we discuss both aspects and give our present knowledge on both phenomena. Though dangerous NEOs and meteorites are one of the main source for cosmic catastrophes, we also focus on other possible dangers, such as even slight changes of Solar irradiance or Earth's orbit, change of Moon's impact on Earth, Solar flares or other manifestations of Solar activity, transit of comets (with impact on Earth's atmosphere), global climate change, dilution of Earth's atmosphere, damage of ozone layer, explosion of nearby Supernovae, and even an attack by extraterrestrial intelligence.

The Ecology of Near-Earth Space Environment

Elena Nikoghosyan
NAS RA V. Ambartsumian Byurakan Astrophysical Observatory (BAO)

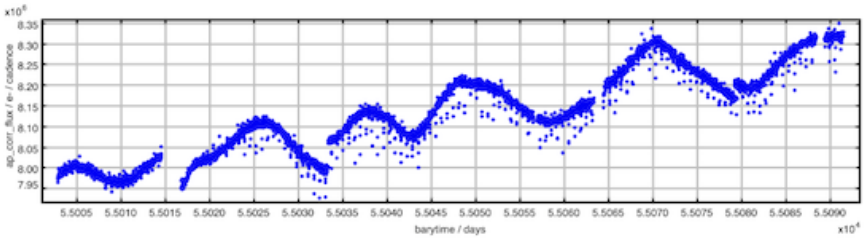
In this paper the technological impacts on the near-Earth environment, which are coming into existence as a result of development and using of the spacecrafts are briefly reviewed.

Materials and technologies used in the Oil & Gas sector based on Astronautic researches

Rafael Jonathan Camilo Vera Rodriguez
Observatorio Astronomico Nacional, Universidad Nacional de Colombia, Bogota, Columbia

Many people don't realise how much the oil & gas sector can be connected with astronomy and astronautic researches. But in fact, many of the actual technologies used in facilities and Early-Production Facilities (EPFs) come from the necessities first raised in the astronomy and aerospace fields. In the following talk I show some examples of materials and detection systems, used in Colombian EPFs, which were first developed from projects connected with astronomy.

Session *Astrostatistics & Astroinformatics*



On the structure of the physical vacuum and its cosmological consequences

Ashot Gevorkyan

NAS RA Institute for Informatics and Automation Problems (IIAP), NAS RA Institute for Chemical Physics

In the representation of the quantum field theory (QFT), the physical vacuum is the infinite set of various fluctuating virtual energetic particles and fields in the R^4 space-time of Minkowski. Recall that the experimental facts such as the Lamb shift between of $2S_{1/2}$ and $2P_{1/2}$ energy levels of the hydrogen atom, Casimir and Unruh effects etc., are important proofs of QFT predictions. In conjunction with this a natural question arises, namely; what is the structure of the physical vacuum (PV) when there are not the external influences on the vacuum? It is obvious, that for study of many nontrivial problems of QV we need to develop a nonperturbative QFT. In this work we consider the propagation of electromagnetic fields in free PV in the framework of Langevin-Maxwell type stochastic differential equations. For the sake of simplicity we have assumed, that the random sources of energetic particles and fields satisfy the correlation conditions of the white noise. The last allows in particular derive the equation for distribution of vacuum fields and, respectively to construct nonperturbative closed theory for the physical vacuum taking into account the influence of the external electromagnetic fields. As it is proved, in the limit of a statistical equilibrium the physical vacuum after some simplifications is described in the 6D space-time, where 4D is the Minkowski space-time, while the additional 2D is the compact topological space in which the physical vacuum is quantized. In other words, the PV without any external influence has a structure. It is shown, that at the absence of the external fields the integral representation for the refractive indices, as one would expect are identically equal to units. When the physical vacuum is under the influence of the external electromagnetic fields, the quantized states are deformed that leads to changes of refractive indices. The last indicates the existence of a new mechanism of the photon-photon scattering which differs from well-known mechanisms describing by the Feynman diagrams of the fourth order. In other words even at the weak external electromagnetic fields the physical vacuum is polarized. This leads to change of refractive indices of the physical vacuum that directly influences on the propagation of photons from other sources. It should be noted that the new mechanism of photon-photon scattering where are detected the non-linear properties of the quantum vacuum has recently been proved by experimentally. The new properties of the PV fundamentally alters our understanding of space-time, that giving us remarkable opportunities for artificial modify properties of ordinary matter. Finally it is necessary to note that the considered properties of the physical vacuum can shed light on the problem of dark energy which now is a central problem of cosmology. In particular, the accelerating expansion of the universe can be explained as a result of lessening the density of the vacuum energy at approaching to the external borders of the visible universe.

On a Possibility of Astrostatistics Methods' Application in the Literature

Haik Harutyunian

NAS RA V. Ambartsumian Byurakan Astrophysical Observatory (BAO)

The description of a method suggested and applied for the statistical studies of flare stars is presented. It is shown that this method might be successfully used for studying other Poisson events including the problem of the authorship of any text of literature or history. The method is based on the usage of the statistical study of the used by the author words.

Computational Astrophysics

Areg Mickaelian[1], Hrachya Astsatryan[2]
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2 – NAS RA Institute for Informatics and Automation Problems (IIAP)

Present astronomical archives contain billions of objects, both Galactic and extragalactic, and the vast amount of data on them allow new studies and discoveries. Astrophysical Virtual Observatories (VO) use available databases and current observing material as a collection of interoperating data archives and software tools to form a research environment in which complex research programs can be conducted. Most of the modern databases give at present VO access to the stored information. This makes possible also a fast analysis and managing of these data. Cross-correlations result in revealing new objects and new samples. Very often dozens of thousands of sources hide a few very interesting ones that are needed to be discovered by comparison of various physical characteristics. VO is a prototype of Grid technologies that allows distributed data computation, analysis and imaging. Particularly important are data reduction and analysis systems: spectral analysis, SED building and fitting, modelling, variability studies, cross correlations, etc. Computational astrophysics has become an indissoluble part of astronomy and most of modern research is being done by means of it.

Armenian Virtual Observatory

Areg Mickaelian
NAS RA V. Ambartsumian Byurakan Astrophysical Observatory (BAO)

Armenian Virtual Observatory (ArVO) was created in 2005 and is part of the International Virtual Observatory Alliance (IVOA), by its contribution of a large database of low-dispersion spectra contained in the digitized Markarian Survey (Digitized First Byurakan Survey, DFBS). ArVO is a project of Byurakan Astrophysical Observatory (BAO) aimed at construction of a modern system for data archiving, extraction, acquisition, reduction, use and publication. One of the ArVO's main tasks is to create and utilize a global Spectroscopic Virtual Observatory, which will combine data from DFBS and other low-dispersion spectroscopic databases, as well as provide the first understanding on the nature of any object up to $B=18^m$. In frame of ArVO, BAO collaborates with NAS RA Institute of Informatics and Automation Problems (IIAP) to develop software for ArVO corresponding to the IVOA standards. Beside DFBS, ArVO is being complemented by the Digitized Second Byurakan Survey (DSBS) database, Byurakan photographic archive, and BAO 2.6m telescope observations. ArVO project includes the creation of a database of digitized FBS spectra and its integration in AVOs, creation of a user interface with a full access to all DFBS data as well as all existing data from other databases. DFBS may be a major contribution to AVOs, giving full access to its data by the astronomical community, including the possibility of preliminary classification of any $<18^m$ object for further study, and the possibility of selecting objects of needed types from the DFBS. A quick optical identification of radio, IR or X-ray sources will be possible by plotting their positions on the DFBS plate and matching all available data. For this, an automatic identification procedure for non-optical sources will be worked out allowing identification for ~100,000 sources. An automatic search for new bright AGN in DFBS and a complete sample of $V<17.5^m$ AGN over 10,000 deg^2 area are one of the main ArVO tasks as well.

Session *Astronomy & Culture, Astrolinguistics*

Armenian Cultural Astronomy

Sona Farmanyan[1], Areg Mickaelian[2]
1 – NAS RA M. Abeghyan Institute of Literature
2 – NAS RA V. Ambartsumian Byurakan Astrophysical Observatory (BAO)

Cultural Astronomy is the reflection of sky events in various fields of nations' culture. In foreign literature this field is also called "Astronomy in Culture" or "Astronomy and Culture". Cultural astronomy is the set of interdisciplinary fields studying the astronomical systems of current or ancient societies and cultures. It is manifested in Religion, Mythology, Folklore, Poetry, Art, Linguistics and other fields. In recent years, considerable attention has been paid to this sphere, particularly international organizations were established, conferences are held and journals are published. Armenia is also rich in cultural astronomy. The present paper focuses on Armenian archaeoastronomy and cultural astronomy, including many creations related to astronomical knowledge; calendars, rock art, mythology, etc. On the other hand, this subject is rather poorly developed in Armenia; there are only individual studies on various related issues (especially many studies related to Anania Shirakatsi) but not coordinated actions to manage this important field of investigation.

The Metaphorical Applications of Heavenly Bodies and Phenomena in Western Armenian Poetry at the Beginning of the XX Century

Karine Arakelyan
NAS RA H. Acharian Institute of Language

The metaphorical applications of heavenly bodies and phenomena in Western Armenian poetry at the beginning of the XX century are very diverse and of great variety. Art Workers eulogize the creation of God, admire the beauty of stars, perceive the man as a part of nature and in the close connection with all other parts. These units are often used for bringing to light one's inner life, his old gone paths, expectations and hopes, many times they become the heart and the basis of poetical image and create unique beauty.

A look at the "Luminous sphere"

Ani Yeghiazaryan
Toumanyan Museum

Hovhannes Toumanyan's watchful eye was fascinated by the mysterious and charming image of the sky since an early childhood. His poetic soul first intuitively, then parallel with the enrichment of his life experience got to know universal luminaries scientifically, became "a universe reader" and the talker of Sirius.

Cosmogonic Perceptions in the Armenian Traditional Musical Instrument-crafting Culture

Hripsime Pikichian
Yerevan State University (YSU), NAS RA Institute of Art

Based on research data and materials recorded by folk musicians and craftsmen, the article presents the musical instrument-crafting in traditional culture, its contribution in to re-establishment of cosmic order. In this context, the several issues are reviewed in detail: individuality of craftsmen and musicians, the raw materials for the creation of instrument, the instrument structure, the manufacturing process, the ornaments and application. According to the traditional view, using the elements of nature and imitating the sounds of nature and human psychological states the master imitates God repeating the process of creation of the Universe. So, the Instrument is held capable to influence the society contributing to the eternity of life.

The Relations between Astronomy and Music in Medieval Armenia

Arpi Vardumyan
"Matenadaran" Mesrop Mashtots Museum of Ancient Manuscripts

In Middle Ages Astronomy and Music were included in the four sciences, together with Mathematics and Geometry. From ancient times philosophers thought that harmony lies in the basis of world creation. The Earth was in the centre of the Universe, and the seven planets went around it, the Sun and the Moon in their number. Harmony was also in the basis of music, with seven sounds due to seven planets. It was considered that owing to harmonic rotation cosmic universal music appears, and it is not attainable for human ear as it is used to it. Medieval connoisseurs of music therapy believed that for healing a person his astrological data must first be cleared out, in order to define in which musical mode should sound the melody in order to treat him/her. Comparing music with astrology they considered easier to practise the first one because the celestial luminaries are much higher and farther from people.

Ancient Earth in Armenian Highland

Sona Farmanyan
NAS RA M. Abeghyan Institute of Literature

Humankind has always sought to recognize the nature of various sky related phenomena and tried to give them explanations. The purpose of this study is to identify ancient Armenian's pantheistic and cosmological perceptions, world view, notions and beliefs related to the Earth. The paper focuses on the structure of the Earth and many other phenomena of nature that have always been on a major influence on ancient Armenians thinking. The initial review covers Moses of Khoren, Eznik of Koghb, Anania Shirakatsi and other 5^{th}-7^{th} centuries historians records about the Earth related superstitious beliefs and cosmological understanding. In the article we give more details about the importance of the belt in Indo-European mythology and its mythical connection to the Earth. By discussing and comparing Universe structure in various regional traditions, myths, folk songs and phraseological units we very often came across to "Seven Heavens" (Seven heavens is a part of religious cosmology found in many major religions such as Islam, Judaism, Hinduism and Christianity (namely Catholicism; Origen, De principiis III, 2,1)) and "Seven Earths". Armenians in their turn divided Earth and Heaven into seven layers. And in science too, both the Earth and the Heaven have 7 layers. The Seven Heavens refer to the layers of our atmosphere. The Seven Earths refer to the layers of the Earth (from core to crust), as well as seven continents. We conclude that the perception of celestial objects varies from culture to culture and preastronomy had a significant impact on humankind, particularly on cultural diversities.

Astronomical terms and names as an indicator of the science level

Haik Harutyunian
NAS RA V. Ambartsumian Byurakan Astrophysical Observatory (BAO)

The connection between the science level and the system of corresponding terms is considered. It is noted that the treasure of terms in the national language should depend on the level of given science. The issue of astronomical terms' origination in antique and modern Armenian is considered.

Astrophysical terms in Armenian

Ararat Yeghikian
NAS RA V. Ambartsumian Byurakan Astrophysical Observatory (BAO)

There are only little astrophysical textbooks (to say nothing about monographs) in Armenian, which are, however out of date and miss all the modern terms concerning space sciences. Many terms have been earlier adopted from English and, especially, from Russian. On the other hand, teachers and lecturers in Armenia need scientific terms in Armenian adequately reproducing either their means when translating from other languages or (why not) creating new ones. In short, a permanently updated astrophysical glossary is needed to serve as explanation of such terms. I am not going here to present the ready-made glossary (which should be a task for a joint efforts of many professionals) but instead just would like to describe some ambiguous examples with comments where possible coming from my long-year teaching, lecturing and professional experience. A probable connection between "iron" in Armenian as concerned to its origin is also discussed.

Astroheraldry

Sona Farmanyan[1], **Areg Mickaelian**[2]
1 – NAS RA M. Abeghyan Institute of Literature
2 – NAS RA V. Ambartsumian Byurakan Astrophysical Observatory (BAO)

Astroheraldry is a branch of heraldry, in which astronomical signs are used (Sun, Moon, stars and constellations). In fact Astroheraldry is the use of astronomical signs in the official items, particularly, state flags and national emblems, coats of arms, crowns, orders and medals, coins and banknotes, stamps and other items. It is a part of the national culture and particularly carries the influence of the Universe perception in the given nation's culture. The branches of Astroheraldry, with the various examples, are presented in this study and especially detailed analysis is given on the use of astronomical signs on the State flags. Armenian Astroheraldry is also presented.

The Impact of Zodiak Signs on Human Nature and Fate

Naira Gasparyan
Yerevan State University (YSU)

Horoscope signs have unavoidable impact on human behaviour and interests, health and even fate. Moreover, intermingled with the impact of planets they become a powerful force able to bring about unbelievable changes. The investigation reveals that horoscopes have existed in the Armenian reality since ancient times. The most striking fact about their existence is that in order to have and use zodiak signs in one's national culture, the nation should first of all have sufficient knowledge in Astrological Sciences since the system of zodiak signs has a direct reference to the cognitive processes and scientific knowledge of the universe, astrological issues and sometimes even there is a hint on hidden signs and messages. Anania Shirakatsi, one of the learned Armenians, had to display much diplomacy with the Armenian Church and religion when discussing the topic in his manuscripts. His observations are still of much importance and vitality even today.

Astrology: Science, Art or Prophesy

Anahit Yeghiazaryan
NAS RA V. Ambartsumian Byurakan Astrophysical Observatory (BAO)

The subject in question is the link between humanity's two earliest disciplines – Astronomy and Astrology. Is it realistic to assume that the arrangement of celestial bodies, planets and stars can provide an opportunity to unequivocally predetermine the faith of the flora and fauna, of single individuals or entire nations living on planet Earth of the Solar System in the entirety of the Universe? Is it possible to ascertain whether astrology is science, art or prophesy?

Session *Archaeoastronomy*

Sisian, Zorats Karer, Karahunge

Hamlet Martirosyan
Centre of Studies of Ancient Civilizations

The Sisian or Zorats Karer megalithic monument is located in the RA Syunik region, 3 km away from the town of Sisian. There are holes between 4-5 cm in diamater in 85 out of 223 stones that are currently upright, each between 0.5-3 m in height. This pre-historic monument was a worship center, as well as an observatory where the Sun, planets and stars rising and setting were observed between VI÷IV millennia B.C. The literal meaning of the construction's original name Sisian means "rising (stones)", and the name Zorats Karer means "stones of the stars" or "stones of the gods". The data from Mesopotamian cuneiform sources and Armenian medieval manuscripts show that the stars (constellations) were considered as personifications of certain gods. In the Zorats Karer worship center, via observations of the rising of a given star, the moment of the respective god's rising from the underground and his influence spreading over the Earth was defined.

Primitive Art and Petroglyphs of Armenia

Karen Tokhatyan
NAS RA Institute of History

Petroglyphs of Armenia have preserved valuable manifestations of primitive knowledge, beliefs and art. Within the scope of this unique iconographic art a number of key issues are examined: the origin of ancient art, its attributes and functions, the relationship between art and science, the role of art as an important means of human cognition and communication. Thus, rock art is presented as subject of art history and aesthetics, manifestation of scientific knowledge of the past, and an oldest iconographic language with characteristic features of book culture. These general scientific aspects are elucidated alongside achievements of ancient Greek and medieval Armenian philosophy. As a result, it becomes obvious that different problems of art during millennia remained within the focus of the Armenian aesthetic mind, testifying to the continuity and succession of creative activitiy in Armenian culture.

The Universe and Armenian Mythology

Gohar Vardumyan
NAS RA Institute of History

Ancient Armenians' perceptions and knowledge about Universe and cosmic phenomena are reflected in pre-Christian mythology. Heathen Armenians, as other developed nations of the Ancient World, knew the five planets of the Solar System seen with the naked eye: Mercury, Venus, Mars, Jupiter and Saturn, each of them embodied in mythology by a god or a goddess. In pantheons formed during III-I millennia B.C. those planets of the starry sky are represented as worshipped, as well as the Sun, the Moon, the Milky Way, Hayk-Orion constellation. The perceptions of ancient Armenians about the Universe, the tangle of mythology and astronomy in their world view are revealed in the cults of gods and goddesses personifying celestial bodies and luminaries.

The ancient Armenian calendars' connection with the celestial bodies

Grigor Broutian
NAS RA V. Ambartsumian Byurakan Astrophysical Observatory (BAO)

The two oldest Armenian calendars – the Haykian and Protohaykian calendars were connected with observations of celestial bodies. Particularly since 2341 B.C. the heliacal rising of the first star of Orion was used to determine the day of the main holiday – Nawasard. Before that the observations of the same star were used in Protohaykian calendar to determine both the beginning and the end of the year. The year was determined as the duration of visibility of the star Betelgeuse. The year started with the heliacal rising of this star and ended with its heliacal setting. The remaining duration was considered to be out of the year. There are also evidences in Armenian medieval literary sources concerning the observations of heliacal rising and setting of Pleiades. An attempt was made to substantiate that the large symbol carved on the rock platform of the small hill in Metzamor also concerns to the Pleiades and shows the direction of heliacal rising of Pleiades.

Cosmology era of Anania Shirakatsi in the context of civilization

Karlen Mirumyan
NAS RA Institute of Philosophy, Sociology and Law

The article is devoted to the justification of the scientific status of cosmology and the problem of its relations with the Christian doctrine, which was important in given the historical and cultural period in the doctrine of the largest Armenian scholar of the 7th century – Anania Shirakatsi. This was the era when the achievements and standards of ancient science was pushed into the background both in the West and the East. In such adverse conditions of the history of science the Armenian scientist not only continued, but also creatively developed a number of ancient astronomical concepts.

Calendar motifs on Getashen hydria

Garegin Vrtanesyan
Centre for the Study of Religions, Russia

Getashen hydria was found in the tombs of the middle bronze age (the first third of the second Millennium B.C.) in Armenia (Lake Sevan). It shows a scene consisting of three friezes. On the lower frieze depicts six zoomorphic figures, on an average six frieze waterfowl, and on top, is the graphic signs. Calendar motives of this composition have a numeric expression, six zoomorphic figures on the lower and middle friezes. Division of the annual cycle into two parts is known in the calendars of the ancient Indo-Iranian ("great summer" and "the great winter"). Animals on the lower frieze of the second mark, "winter" road of the Sun, because in this period are the most important events, ensuring the reproduction of the economy of the society. This rut ungulates – wild (deer) and domestic (goats). Moreover, the gon goats end in December, almost coinciding with the onset of the winter solstice. A couple of dogs on the lower frieze marks the version of the myth, imprisoned in the rock hero – the Sun (Mihr – Artavazd), to which his dogs have to chew the chains, anticipating his exit at the winter solstice. This is indicated by the direction of their movement, the Sun moves from left to right for an observer, only when located on the South side of the sky (i.e., beginning with the autumnal equinox). The most important event of the period of "summer road" of the Sun is the vernal equinox, which coincide with the arrival of waterfowl (ducks, geese). Their direction on the second frieze (left to right) corresponds to the position of the observer, facing North.

Documentation of historical events in Anania Shirakatsi's writings

Nora Yerznkyan
Yerevan State University (YSU)

This article is a sort of guide to focus reader's attention not only on Anania Shirakatsi's 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. 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.

Astronomical understanding of G. Narekatsi

Samvel Poghosyan
"Armon" Research Centre, Georgia

Abstract is not available.

Session *Scientific Tourism & Scientific Journalism*

The importance of development of Scientific Tourism in Armenia

Robert Minasyan, **Naira Nalbandyan**
Armenian Institute of Tourism (AIT)

This article is devoted to the development of scientific tourism in Armenia. The article presents the cultural resources that may be scientific tourism resources. The importance, characteristics and prospects of scientific tourism and scientific sightseeing tourism in Armenia are briefly described.

The aim and participation of scientific tourism in evaluation, recognition and widening of the country's historical and cultural heritage

Davit Tashchyan
Econom Tour

Though the phenomenon of scientific tourism is wide spread in the USA and Europe, it is a new branch in Armenian tourism. The aim of the scientific tourism is to establish relationship between the tourist and the scientist, without the tourist having any material interest. The main aim is to involve the tourist in the scientific works, giving him a chance to be a part of the expedition. One of the main goals is also to involve the local tourist in the exploration of the historical and cultural heritage. It is important to mention that besides having the chance to take part in the scientific exploration, they also enjoy the time. It gives an opportunity to make the relation between the tourist and the scientist more strengthen, ant let them partnering for future. The scientific tourism gives the scientist an opportunity to get new volunteers to make it wide known for the society. What refers to a tourist it is a good chance for him to be a part of a scientific exploration, to satisfy his own interest, to get new knowledge, and take part in the development of his own country.

Lost Knowledge

Vazgen Gevorgyan
Discover New Travel LLC

This article presents the results of our many years' scientific research in Tatev Monastery. By comparing many nighttime observations with very accurate astronomical data (astronomical data were presented by Russian astronomer Yelena Gienko) it was found out the real astronomical meaning of Tatev Syun (Gavazan). Tatev Syun (Gavazan) is terrestrial-celestial astronomical indicator directed to Hayk-Orion's belt, what helped Armenian astronomers and chronologists to calculate terrestrial time cycles with astronomical accuracy.

Scientific Journalism in Armenia

Sona Farmanyan[1], Areg Mickaelian[2]
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In the present study, the problems of scientific journalism and activities of Armenian science journalists are presented. Scientific journalism in the world, forms of its activities, Armenian Astronomical Society (ArAS) press-releases and their subjects, ArAS website *"Mass Media News"* section, annual and monthly calendars of astronomical events, and *"Astghagitak"* online journal are described. Most interesting astronomical subjects involved in scientific journalism, reasons for non-satisfactory science outreach and possible solutions are discussed.

Session *Armenian Astronomy*

Amateur Astronomy in Armenia: Current Situation

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"Goodricke John" Amateur Astronomers NGO

This report describes the current situation about the amateur astronomy in Armenia and briefly outlines the activities of "Goodricke John" amateur astronomers NGO in 2013 and 2014. Particular attention is paid to the project supported by Ministry of Education for organization of open classes on astronomy and practical stargazing exercises in schools. Similarly, the report highlights the projects developed with and funded by the RA Ministry of Defense, which enabled organization of stargazing exercises in several military units in Armenia in August 2014.

Astronomy Teaching Problems in Armenia

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Astronomy, like any science, constantly develops unlimitedly approaching absolute objective truth; every moment of its accomplishments are due to the level of public welfare demands and culture. Armenia for centuries had a major contributor to the ancient as well as to the modern astronomy development. But it has been already a couple of years that the "Astronomy" course is not present at the schools of Armenia. Despite that fact, several schools put an effort to stress the importance of that subject by extracurricular groups trying to fill that gap. How this work is carried out and what results do we have? What can be done to increase the level of astronomical education as well as for its expansion?

Armenian Astronomical Society Annual Activities in 2014

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A report is given on the achievements of the Armenian astronomy during the last year and on the present activities of the Armenian Astronomical Society (ArAS). ArAS membership, ArAS electronic newsletters (ArASNews), ArAS webpage, annual meetings, Annual Prize for Young Astronomers (Yervant Terzian Prize) and other awards, international relations, presence in international organizations, summer schools, astronomical Olympiads and other events, matters related to astronomical education, astronomical heritage, astronomy outreach and ArAS further projects are discussed. The present meeting, BAO Science Camp, ArAS School lectures are among 2014 events as well.

ASTRONOMICAL NATIONAL OLYMPIAD

The final (Republican) phase of the Astronomical School Olympiad was held at Yerevan, Phys.-Math. School (PMS) after A. Shahinyan on March 31. In total 15 pupils participated. Dr. Ashot Hakopian, BAO senior researcher, was the Chair of the Jury and the other members were Dr. Avetik Grigoryan, Dr. Marietta Gyulzadian, Dr. Emilia Karapetian, Dr. Areg Mickaelian, Dr. Tigran Nazaryan, and Dr.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, the and "Quantum" college showed the best results. As a result, First-rank diploma was awarded to Hrant Topchyan (PMS), Second-rank diploma to Edgar Vardanyan (PMS), Third-rank diploma to Eduard Khalafyan ("Quantum"), Mickael Mkrtchyan (PMS), Ashot Matevosyan ("Quantum") and Ashot Movsisyan (PMS).

This Olympiad was also a qualifying phase for 2015 International Astronomical Olympiad (IAO) in Russia and International Olympiad of Astronomy and Astrophysics (IOAA) in Indonesia. Let us remind that the Armenian pupils have excellent traditions at IAO, having 9 gold, 5 silver and 19 bronze medals in total and by team counts being one of the best during the whole 19-year history of Olympiads.

RELEASE OF IAU ASTRONOMY OUTREACH NEWSLETTER APRIL ISSUE

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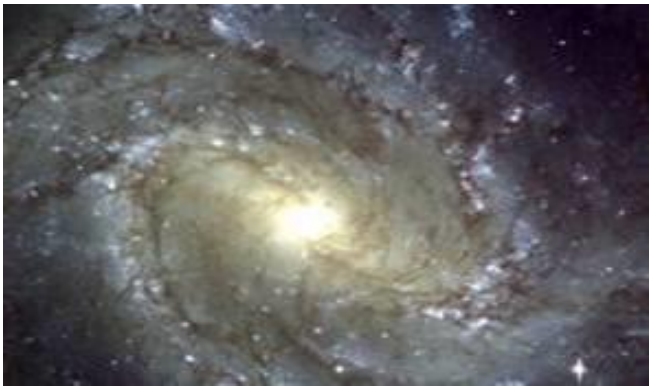
The newsletter is available in the following link:http://www.iau.org/public/publications/newsletter/2015_03/

RELEASE OF ASTROCOURIER APRIL ISSUE



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Astrocourier Newsletter is available in the following link:http://www.sai.msu.su/EAAS/rus/astrocourier/070415.htm

Armen Sedrakian- 50

Recently Prof. Armen Sedrakian celebrated his 50th anniversary. He was born on 1 April 1965 in Yerevan, Armenia. In 1989 he graduated from Rostock University with a Diploma in Physics and in 1992 obtained his Ph.D. degree in Yerevan State University (YSU). In 1993-1996 he worked at MPI for Nuclear Physics, Rostock-Heidelberg, Germany, in 1996-98, at CRSR, Cornell University, Ithaca, N.Y., USA, in 1998-2001, at KVI, University of Groningen, The Netherlands, and in 2002-06, at Institute for Theoretical Physics (ITP), University of Tübingen, Germany. In 2006, he obtained his Habilitation at Tübingen University and in 2007, Doctor of Physical and Mathematical Sciences degree at YSU. At present he is a Lecturer (Privatdozent) at ITP, Goethe-University, Frankfurt am Main, Germany (since 2007), as well as Professor at YSU (since 2011). Prof. Sedrakian also had visiting positions at Institut de Physique Nucleaire d'Orsay, France (2001), multiple short-term visits at INT, Seattle, USA (1999-2014), he was Junior Fellow at ECT, Trento, Italy (2000) and he was Visitor at Albert-Einstein-Institute, Potsdam, Germany (2013-2014). In 2014, Prof. Sedrakian was elected Foreign Member of Armenian National Academy of Sciences.

For more information, please visit Prof. Sedrakian's personal webpage:
http://astro.uni-frankfurt.de/sedrakian/vita/

For reading Prof. Sedrakian's interview in Armenian, please follow the link:
http://168.am/2015/04/19/480773.html

Bernhard Brandl– 50

Prof. Brandl celebrates his 50th anniversary. He was born on 7 April 1965 in Netherlands. In 1991 he graduated from DESY (Germany). He obtained his Ph.D. degree in 1996 at MPE / LMU Munich (Germany). In 1996-2000 he was Research Associate, and in 2000-2003, Senior Research Associate at Cornell University (Ithaca, N.Y., USA). In 2003-2015 he was Associate Professor, and since 2015 he is Full Professor at Leiden University & Technical University Delft (Netherlands).

Prof. Brandl's scientific interests include massive star clusters and starbursts, infrared spectroscopy and instrumentation. He is a member of the instrument teams of Spitzer-IRS, JWST-MIRI and E-ELT-MIDIR.

For more information, please visit Dr. Brandl's personal webpage:
http://home.strw.leidenuniv.nl/~brandl/#positions

MAY CALENDAR OF ASTRONOMICAL EVENTS