ArAS News

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ARMENIAN ASTRONOMICAL SOCIETY (A r A S)

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CONTENTS:

The ArAS Newsletter in the INTERNET: *http://www.aras.am/ArasNews/arasnews.html*

IAU XXVIII GENERAL ASSEMBLY in BEIJING

The International Astronomical Union (IAU) XXVIII General Assembly (GA) was held on **August 20-31, 2012** in **Beijing, China**. China for the first time hosted the IAU GA in Beijing; the venue was the new China National Convention Center (CNCC). GA participants had an opportunity to experience the wide range of astronomical activities now taking place in China that include new projects, facilities, and institutes. They also reported on, heard and discussed the latest research results from every field of astronomy.

The General Assembly had 4 Invited Discourses, 8 IAU Symposia, 18 Special Sessions, 7 Joint Discussions, Special Lunchtime Lectures, and a number of administrative meetings. The following meetings were included in the program:

IAU Symposia

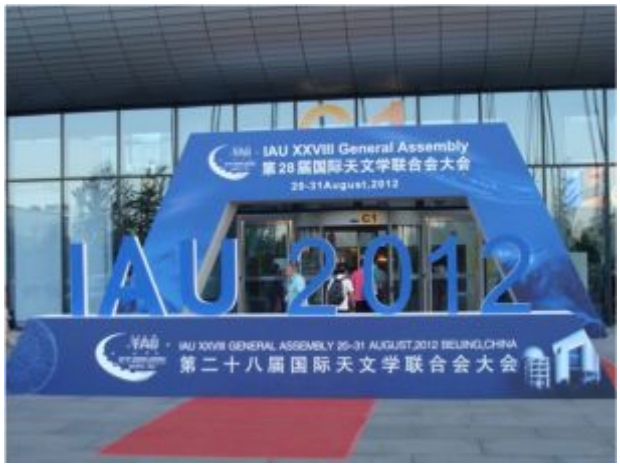
IAU S288 Astrophysics from Antarctica
IAU S289 Advancing the physics of cosmic distances
IAU S290 Feeding compact objects: Accretion on all scales
IAU S291 Neutron stars and pulsars: Challenges and opportunities after 80 Years
IAU S292 Molecular Gas, Dust, and Star Formation in Galaxies
IAU S293 Formation, detection, and characterization of extrasolar habitable planets
IAU S294 Solar and astrophysical dynamos and magnetic activity
IAU S295 The intriguing life of massive galaxies

Special Sessions

SpS1 Origin and complexity of massive star clusters
SpS2 Cosmic evolution of groups and clusters of galaxies
SpS3 Galaxy evolution through secular processes
SpS4 New era for studying interstellar and intergalactic magnetic fields
SpS5 The IR view of massive stars: the main sequence and beyond
SpS6 Science with large solar telescopes
SpS7 The impact hazard: current activities and future plans
SpS8 Calibration of star-formation rate measurements across the electromagnetic spectrum
SpS9 Future Large Scale Facilities
SpS10 Dynamics of the star-planet relations
SpS11 IAU Strategic Plan and the Global Office of Astronomy for Development
SpS12 Modern views of the interstellar medium
SpS13 High-precision tests of stellar physics from high-precision photometry
SpS14 Communicating astronomy with the public for scientists
SpS15 Data intensive astronomy
SpS16 Unexplained spectral phenomena in the interstellar medium
SpS17 Light Pollution: Protecting Astronomical Sites and Increasing Global Awareness through Education
SpS18 "Hot Topics" for each week 24 August & 31 August

Joint Discussions

JD1 The highest-energy gamma-ray universe observed with Cherenkov telescope arrays
JD2 Very massive stars in the local universe
JD3 3-D views of the cycling Sun in stellar context
JD4 Ultraviolet emission in early-type galaxies
JD5 From meteors and meteorites to their parent bodies: Current status and future developments
JD6 The connection between radio properties and high-energy emission in AGNs
JD7 Space-time reference systems for future research



Altogether, more that 2700 astronomers were present from some 70 countries, as well as representatives of many organizations, journalists, etc., some 3000 guests in total. Some 700 invited talks, some 1100 contributed talks, and 1390 posters were presented in all meetings.

There were 6 Armenian astronomers participating in IAU GA XXVIII, including 2 from Armenia (Ruben R. Andreasyan and Areg M. Mickaelian from BAO) and 4 from other countries: Igor V. Chilingarian (Harvard, USA), Valery V. Hambarian (AIU Jena, Germany), Alex Lazarian (University of Wisconsin–Madison, USA) and Gagik H. Tovmassian (UNAM, Mexico), They participated in the following meetings and presented the following contributions:

Ruben Andreasyan: SpS 4 poster: *"Magnetic field structure near the Galactic plane"* (R. Andreasyan, S. Balayan, V. Movsisyan)

Igor Chilingarian: IAU S292 poster: *"A universal ultraviolet-optical colour-colour-magnitude relation of galaxies"* (I. Chilingarian, I. Zolotukhin), IAU S295 poster: *"Stellar populations of massive galaxies at intermediate redshifts"* (I. Chilingarian), SpS01 poster: *"Precise stellar masses of ultracompact dwarf galaxies"* (I. Chilingarian), SpS01 poster: *"The new technique for the determination of the initial mass function of unresolved stellar populations"* (N. Podorvanyuk, I. Chilingarian, I. Katkov)

Valery Hambaryan: IAU S291 poster: *"Constraints on the Compactness of the Isolated Neutron Stars via X-ray Phase-resolved Spectroscopy"* (V. Hambaryan)

Alex Lazarian: SpS04 talk: *"Magnetic fields and turbulence"* (A. Lazarian), SpS04 poster: *"Studying magnetic fields through dust polarization: a quantitative and predictive model of alignment by radiative torques"* (T. Hoang, A. Lazarian), SpS12 poster: *"Turbulent magnetic reconnection as a possible solution for the magnetic braking problem in protostellar disks"* (R. Santos-Lima, E. de Gouveia Dal Pino, A. Lazarian)

Areg Mickaelian: IAU S290 poster: "The sample of FBS cataclysmic variables" (A. Mickaelian, P. Sinamyan), IAU S292 poster: "Study of the sample of Byurakan-IRAS galaxies" (A. Mickaelian, G. Harutyunyan), IAU S295 poster: "Byurakan-IRAS galaxies as massive galaxies with nuclear and starburst activity" (A. Mickaelian, G. Harutyunyan), SpS05 poster: *"New IR data on the Byurakan-IRAS Stars (BIS)"*

(A. Mickaelian, K. Gigoyan), SpS11 talk: *"Armenia as a Regional Center for "Astronomy for Development" activities"* (A. Mickaelian), SpS13 poster: "Photometric analysis of large catalogues and databases based on POSS1 and POSS2 surveys" (A. Mickaelian), SpS15 poster: *"ArVO products and services on ArmCluster"* (A. Mickaelian, A. Knyazyan, H. Astsatryan), SpS15 poster: *"MW studies of Markarian galaxies in frame of the Armenian Virtual Observatory"* (A. Mickaelian, H. Abrahamyan, G. Paronyan, G. Harutyunyan), JD06 poster: *"Study of the radio-X-ray properties of AGN based on their complete sample"* (A. Mickaelian, G. Paronyan, H. Abrahamyan)

Gagik Tovmassian: IAU S290 talk: *"Accretion disks of bounce back cataclysmic variables"* (G. Tovmassian)

Areg Mickaelian also participated in the administrative meetings of the IAU National Representatives and several working groups.

New **IAU Executive Committee** was elected for 2012-2015:

President: Norio Kaifu (Japan)
President-elect: Silvia Torres-Peimbert (Mexico)
General Secretary: Thierry Montmerle (France)
Assistant General Secretary: Piero Benvenuti (Italy)
Vice-presidents (incoming): Renée Kraan-Korteweg (South Africa), Xiaowei Liu (China Nanjing) and Dina Prialnik (Israel)
Vice-presidents (second-term): Matthew Colless (Australia), Jan Palous (Czech Republic) and Marta Rovira (Argentina)
Advisers: Bob Williams (Past IAU President, USA) and Ian Corbett (Past IAU General Secretary, UK)

The **IAU Divisions** were reorganized into 9 new ones for 2012-2015 and their Presidents and Vice-Presidents were elected:

Division A: Space and Time Reference Systems. President: Sergei Klioner (Germany), Vice-president: Jacques Laskar (France)
Division B: Facilities, Technologies and Data Science. President: David Silva (USA), Vice-president: Pietro Ubertini (Italy)
Division C: Education, Outreach and Heritage. President: Mary Kay Hemenway (USA), Vice-president: Hakim Malasan (Indonesia)
Division D: High Energies and Fundamental Physics. President: Diana Worrall (UK), Vice-president: Felix Aharonian (Ireland/Germany)
Division E: Sun and Heliosphere. President: Lidia van Driel (UK), Vice-president: Yuhua Yan (China)
Division F: Planetary Systems and Bioastronomy. President: Giovanni Valsecchi (Italy), Vice-president: Nader Haghighipour (USA)
Division G: Stars and Stellar Physics. President: Ignasi Ribas (Spain), Vice-president: Corinne Charbonnel (France)
Division H: Interstellar Matter and Local Universe. President: Ewine van Dishoek (Netherl.), Vice-president: Joss Bland-Hawthorn (Australia)
Division J: Galaxies and Cosmology. President: Françoise Combes (France), Vice-president: Thanu Padmanabhan (India)

Nominating, Membership, Resolutions and Financial committees were also elected. The IAU budget was established for 2013-2015 as EUR 2 million 915 thousand. 1046 new IAU members were accepted, including two from Armenia: Susanna Hakopian and Elena Nikogossian (both from BAO). Now IAU has 10,938 members, including 23 from Armenia.

More details are available at IAU GA XXVIII web site: http://www.astronomy2012.org/dct/page/1

Areg Mickaelian

ARMENIAN ASTRONOMY AS PRESENTED AT IAU GA XXVIII

The history of Astronomy in Armenia goes back to very old ages. Since ancient times Armenians accumulated astronomical knowledge and have left this heritage in the forms of rock art, ancient observatories, calendars and chronology, historical records of astronomical events (Solar and Lunar eclipses, comets, Supernovae, etc.), medieval sky maps, astronomical terms, etc. (http://www.aras.am/Archaeoastronomy/astronomyancientarmenia.html).

Nowadays Armenia is one of the developed countries in astronomical sense as well. It is amazing that being such a small country by its territory (143rd in the world) and population (134th), it has a high activity in astronomy at all levels: professional, educational and public. By its economic level Armenia is among the developing countries (by different estimates, 124th-128th in the world), and it is situated in a region (Middle East), where efforts are needed to develop and promote astronomical education and knowledge. The modern Armenian astronomy has an international recognition due to a number of reasons:

- the Byurakan Astrophysical Observatory (BAO, http:///www,bao.am) is one of the important astronomical centres in the Middle East region,
- the discoveries and achievements by the outstanding scientist, former IAU and ICSU President *Prof.* Viktor Ambartsumian (1908-1996, http://www.aras.am/FamousAstronomers/ambartsumian.html) and his famous colleagues (http://www.aras.am/FamousAstronomers/famousarmastr.html) are well known,
- the largest in the region 2.6m (http://www.bao.am/2_6m.htm) and one of the largest in the world 1m Schmidt (http://www.bao.am/1m.htm) telescopes,
- many important international meetings (http://www.aras.am/BAO/meetings.html), including **four IAU Symposia (1966, 1986, 1989, and 1998; one more planned for 2013) and an IAU Colloquium (2001)** (http://www.aras.am/Meetings/meetingsIAU.html), as well as the Joint European and National Astronomical Meeting (JENAM) in 2007 (http://www.aras.am/Jenam2007/index.htm),
- the recently established series of Byurakan International Summer Schools (BISS in 2006, 2008, 2010, and planned in 2012, http://www.aras.am/Meetings/meetingsSummerSchools.html), where the regional students can train and get experience,
- active international collaboration with a number of countries (http://www.aras.am/BAO/collaboration.html), such as USA, UK, France, Italy, Germany, Spain, Russia, Georgia, Bulgaria, Japan, China, Mexico, Australia, and others,
- international PhD program that in 1970s-2000s has awarded scientific degrees to astronomers from Russia, Ukraine, Hungary, Bulgaria, Georgia, Azerbaijan, Uzbekistan and Jordan,
- famous Byurakan (Markarian) surveys and one of the largest world astronomical spectroscopic databases (DFBS, http://www.aras.am/Dfbs/dfbs.html), which recently was included in the UNESCO *"Memory of the World"* international register,

- Armenian Virtual Observatory (ArVO, http://www.aras.am/Arvo/arvo.htm), which is one of the 19 (17 national and 2 European) members of the IVOA (http://www.ivoa.net) and which is the only such project in the Middle East region,
- very active Armenian Astronomical Society (ArAS, http://www.aras.am/), an affiliated member of the European Astronomical Society (EAS), having 95 members, including those from 21 countries (Armenia, USA, France, Mexico, Germany, Russia, Spain, etc.), Annual Meetings, Electronic Newsletters, Annual Prizes for Young Astronomers,
- one of the major international prizes in astronomy (USD 500,000), recently established Viktor Ambartsumian International Prize (http://vaprize.sci.am/) with an International Steering Committee, including two IAU Presidents (*Prof.* Catherine Cesarsky and *Prof.* Robert Williams),
- Galileo Teachers Training Program (GTTP, http://www.aras.am/Iya2009/GTTP.htm) and very successful participation of the Armenian pupils in the International Astronomical Olympiads (http://www.aras.am/Education/IAOs.html).

The Byurakan Astrophysical Observatory 2.6m telescope

Professional astronomical research in Armenia is being carried out at BAO, Yerevan State University (YSU), Yerevan Physics Institute (YerPhI), and some other (smaller) institutions. BAO is in fact an astronomical centre for the whole Middle East region. Founded in 1946 by Viktor Ambartsumian, it is one of the research institutions of the Armenian National Academy of Sciences (NAS RA). **The scientific research of the observatory is related mainly to the instability phenomena taking place in the Universe (young stellar objects, stellar associations, variable stars, starburst galaxies and AGN) and theoretical astrophysics, as well as new fields are being investigated, such as high energy / relativistic astrophysics and exoplanets.** Over ten thousand new objects have been discovered in Byurakan. Markarian, Arakelian, and Kazarian galaxies, Shahbazian compact groups of compact galaxies and other objects are well-known.

Astronomical education in Armenia (http://www.aras.am/Education/education.html) consists of 4 levels (school education, university B.Sc. and M.Sc. studies (at YSU), and Ph.D (at BAO and YSU). GTTP Armenian program started during IYA-2009 and at present involves many specialized schools and teachers. There are astronomy groups at the specialized schools with deeper courses compared to the general curriculum. Armenian pupils have won 7 gold, 4 silver, and 13 bronze medals at the International Astronomical Olympiads.

Public outreach activities include public and school lectures by Armenian astronomers, maintenance of the *"Calendar of Astronomical Events"* and many other popular pages at the ArAS website, the recently formed group of scientific journalists and wide advertisement of astronomy,

etc. IYA-2009 Armenian National Committee has been active during 2009 and initiated a number of meetings, popular lectures, and other events (http://www.aras.am/Iya2009/Iya2009.htm). This continued in frame of Beyond-IYA project too (http://www.aras.am/Iya2009/Beyond-IYA.htm) and at present is being continued as well.

IAU Strategic Plan for Astronomy Development in the World envisages establishment of Regional centres (nodes) in different areas, which will coordinate the program for their neighboring countries. Armenia and particularly BAO may serve as a reliable centre for astronomy development in the Middle East region, involving the South Caucasus countries (Armenia, Georgia and Azerbaijan), Arabic countries, Iran and Turkey, where efforts are being made to develop astronomy. We have proposed to host an **IAU Regional Office for Astronomy Development (ROAD)** and we also plan to encourage the creation of national nodes in neighboring countries to keep contacts and coordinate activities through them. A number of activities have been planned for 2012-2020.

Areg Mickaelian

VIKTOR AMBARTSUMIAN INTERNATIONAL PRIZE 2012

***Official Press-Release of Viktor Ambartsumian International Prize Steering Committee**, 21.07.2012, Yerevan, Armenia*

Viktor Ambartsumian International Prize 2012 goes to Estonian astrophysicist ***Prof.*** **Jaan Einasto** and Russian astrophysicist ***Prof.*** **Igor Novikov.**

Viktor Ambartsumian International Prize has been established by the President of Armenia in 2009 and at present is one of the important awards in astronomy/astrophysics and related sciences. It is being awarded to outstanding scientists from any country and nationality having significant contribution in science. The Prize totals USD 500,000 and since 2010 is being awarded once every two years.

The deadline for nominations was March 18, and the International Steering Committee chaired by the President of the Armenian National Academy of Sciences *Prof.* Radik Martirosyan received nominations from national academies of sciences, universities, observatories, and Nobel Prize winners for 12 outstanding scientists and teams from different countries. After a thorough study of the nominated works, as well as independent referees' reports, the Committee had several discussions and finally it was decided to share the Prize between ***Prof.*** **Jaan Einasto** (Tartu Observatory, Estonia), nominated by Tartu Observatory, Estonia *"for his fundamental contributions to the discovery of dark matter and the cosmic web"* and ***Prof.*** **Igor Novikov** (Astro-Space Center, P.N. Lebedev Physics Institute, Russia) nominated by the Institute of Theoretical Physics and Astronomy of Vilnius University, Lithuania *"for his pioneering formulation how to confirm observationally that our Universe started as a hot one, and for proposing the method for determination of quasar masses"*.

Jaan Einasto (83) is asenior scientist at the Tartu Observatory, Estonia. Since 1952 he works at Tartu Observatory, Estonia. He took his Ph.D. degree in 1955, became Doctor of Sciences in 1972 and was elected a member of the Estonian Academy of Sciences in 1981. In 1976-1992 he was the Head of the Department of Physics of Galaxies of the Tartu Observatory and in 1983-1995 the Head of the Division of Astronomy and Physics of the Estonian Academy of Sciences. In 1992-1995 he was a Professor of Cosmology at the Tartu University and in 1992-1997 the Head of the Department of Cosmology at the Tartu Observatory. The main fields of *Prof.* Einasto's research are structure and kinematics of stellar populations in Galaxy, structure and evolution of galaxies; large-

scale distribution of galaxies and clusters of galaxies; dark matter; evolution of the large-scale structure. *Prof.* Einasto has published more than 190 scientific papers. He has been awarded the Estonian science prize (1982, 1998, 2003, 2007), the Order of the National Coat of Arms (1998), Marcel Grossmann Award (2009) and title of the Tartu University honorary doctor (2010).

Igor Novikov (77) is the Deputy-Director of the Astro-Space Center in P.N.Lebedev Physics Institute (Moscow, Russia) since 2006 and Emeritus Professor at the Copenhagen University (Denmark) since 2005. He took his Ph.D. degree in 1963, became Doctor of Sciences in 1970 and was elected a Corresponding Member of the Russian Academy of Sciences in 2000. In 1994 he founded the Theoretical Astrophysics Center in Copenhagen, of which he was the Director until 2004. *Prof.* Novikov is deeply involved in the ESA Planck Mission project, which is a project devoted to measurements of the CMB anisotropy. Igor Novikov is one of the coordinators of the project and a member of the Plank Scientific Evaluation Committee since 1998. He is known as an outstanding organizer and scientific leader of research groups both in Moscow and in Copenhagen. *Prof.* Novikov has published more than 400 scientific papers and books, 12 monographs, about 150 popular articles and 15 popular books. He has been awarded Felice Pietro Chisesi and Caterina Tomassoni Prize (2005), Decorated with the order State Banner (Denmark) for achievements in science (2006) and Eddington Medal of the Royal Astronomical Society (2007).

References:

Einasto J., Kaasik A., Saar E. 1974, *Dynamic evidence on massive coronas ofgalaxies*, Nature, 250, 309; Einasto J., Jõeveer M., Saar E. 1980, *Structure of superclusters andsupercluster formation*, MNRAS, 193, 353.

Doroshkevich A.G., Novikov I.D., 1964, *Mean Density of Radiation in the Metagalaxy and Certain Problems in Relativistic Cosmology*, Reports USSR Acad., 9, 111; Doroshkevich A.G., Zeldovich Ya.B., Novikov I.D., 1965, *Gravitational Collapse of Nonsymmetric and Rotating Masses*, JETP, 22, 122.

The winners of Viktor Ambartsumian International Prize 2012 were announced at the press-conference held at the Armenian National Academy of Sciences on Friday, July 21. The official award ceremony will take place on September 18 in Yerevan.

SUMMER SCHOOL IN PUSHCHINO

The 8th school on "Modern astrophysics" was held on July 2-13 in Pushchino Radioastronomical Observatory (Russia). Its subject was *"Plasma physics and theory of pulsars"*. The course consisted of 40 lectures and laboratory works. The lecturers were Pushchino Radioastronomical Observatory and Lebedev Physics Institute (Russia) researchers, as well as physicists from the Russian Academy of Sciences Institute of Applied Physics and Institute of Geology. The number of young participants was 38. There were two Armenian participants: **Hasmik Andreasyan** (YSU Physics Faculty 4th year student) and **Arpine Piloyan** (fellow of the YSU Physics Faculty Theoretical Physics Chair). The participants gave written examinations and received certificates.

Hasmik Andreasyan,
YSU Physics Faculty 4th year student

THE LITHIUM PROBLEM IN COSMOLOGY

Garik Israelian's (Instituto de Astrofisica de Canarias, Tenerife, Canary Islands, Spain) article *"Cosmology: The lithium problem"* was recently published in Nature 489, 37-38 (06 September 2012; published online 05 September 2012).

The theory that predicts how the lightest elements formed after the Big Bang has hitherto failed to explain the amount of cosmic lithium. The detection of interstellar lithium beyond the Milky Way gives this theory a boost.

The full article is accessible at http://www.nature.com/nature/journal/v489/n7414/full/489037a.html

EXOPLANET HOSTING STARS GIVE FURTHER INSIGHTS ON PLANET FORMATION

An international team, led by EXOEarths researchers (Centro de Astrofísica da Universidade do Porto - CAUP), proposes that metals like Magnesium might have an important role in the formation of low mass planets.

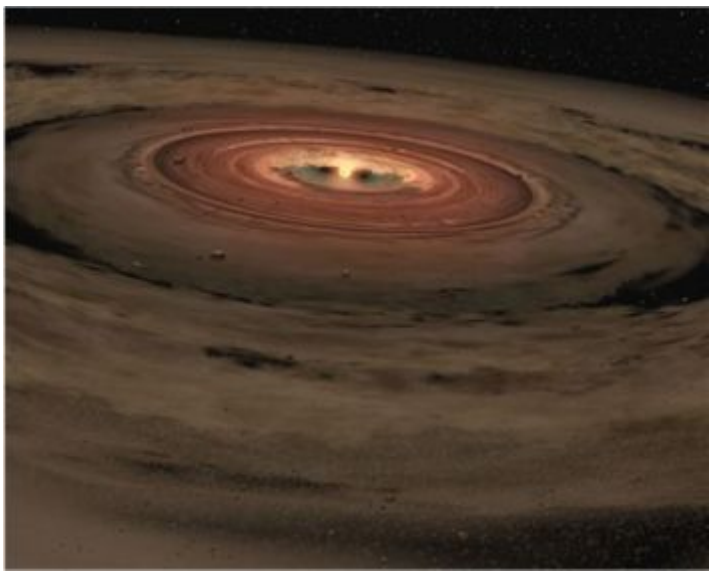
The team, lead by CAUP researcher Vardan Zh. Adibekyan, analyzed high resolution spectra of 1111 sun-like stars, obtained by the HARPS spectrograph (ESO). Of these stars, 109 are known to harbor high mass (Jupiter-like) planets, and 26 have Neptune-like planetary companions.

The team focused especially on studying the abundance of Alpha Elements in these stars, like Magnesium (Mg), Silicon (Si) or Titanium (Ti). The research found that the ratio of these, compared with the amount of Iron (Fe), was consistently higher in stars with planets, with the greatest discrepancy observed for Mg.

The lead author of the paper, CAUP Astronomer Vardan Zh. Adibekyan commented *"These findings indicate that some metals other than iron are involved in the process of planet formation, especially when the amount of iron is lower than solar. These results may provide strong constraints for the models of planet formation, especially for planets with low mass"*.

The leading theories of planet formation suggest that planets form by clumping smaller particles of heavy elements (metals), into larger and larger bodies. The results put forward by the present

study suggest that planets need a minimum amount of “metals” to be formed. The formation of planets, even the lowest mass ones, is dependent on the dust content of the cloud that gave origin to the star and planetary system.



The results will be published in:
V.Zh. Adibekyan, N.C. Santos, S.G. Sousa, G. Israelian, E. Delgado Mena, J.I. González Hernández, M. Mayor, C. Lovis and S. Udry, Overabundance of α-elements in exoplanet-hosting stars, A&A, Vol. 543, 2012 (accepted)
(http://www.aanda.org/index.php?option=com_article&access=standard&Itemid=129&url=/articles/aa/abs/2012/07/aa19564-12/aa19564-12.html)

The results also were presented by Vardan Adibekyan at a seminar held in Byurakan on August 27.