

ArAS News

NEWSLETTER OF THE
ARMENIAN ASTRONOMICAL SOCIETY (A r A S)

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

EUROPEAN WEAK of ASTRONOMY and SPACE SCIENCE (EWASS) 2013



The European Week of Astronomy and Space Science (EWASS), formerly known as JENAM (Joint European and National Astronomical Meeting) in 2013 will take place in on 8 - 13 July 2013 in Logomo Centre in Turku, Finland. EWASS 2013 will host 7 plenary talks, 12 Symposia, 16 Special Sessions, and 5 Special Meetings on various aspects of modern astronomy. The conference will address a wide range of topics in Astronomy and Space Sciences and related technologies that are of interest to the European astronomical community. The EAS General Assembly, the EAS Council Meeting, the GREAT Plenary

Meeting (PM6), Plenary discussion on the ASTRONET Mid-Term Review and awards of EAS prizes will also take place during EWASS 2013. The following meetings and talks are included in the program:

EWASS Symposia

- S1: Solar activity and its manifestations in the heliosphere (*Convener*: Rami Vainio)
- S2: The physics of accretion on compact objects (*Convener*: Juri Poutanen)
- S3: Science with Planck data (*Convener*: Pekka Heinämäki)
- S4: The mystery of ellipticals (*Convener*: Peter Johansson)
- S5: Local group, local cosmology (*Conveners*: Matteo Monelli / Stefania Salvadori)
- S7: Stellar magnetic activity across the HR diagram (*Convener*: Maarit Mantere)
- S8: Deaths of massive stars as supernovae and gamma-ray bursts (*Convener*: Seppo Mattila)
- S9: Extreme physics of neutron stars (*Convener*: Dmitry Yakovlev)
- S10: The co-evolution of black holes and galaxies (*Convener*: Jari Kotilainen)
- S11: Gaia research for European astronomy training (*Convener*: Nicholas Walton)
- S12: The gamma-ray sky in the era of Fermi and Cherenkov telescopes (*Conveners*: Tuomas Savolainen / Elina Lindfors)

EWASS Special Sessions

- Sp1: Astronomy education and public outreach (*Convener*: Mikko Hanski)
- Sp2: RADIONET
- Sp3: Fundamental stellar parameters (*Convener*: Luca Casagrande)
- Sp4: The origin of interstellar dust (*Convener*: Patrice Bouchet)
- Sp5: Thick discs: clues for galaxy formation and evolution (*Convener*: Sebastien Comeron)
- Sp6: AGN, galaxy mergers, supermassive black holes and gravitational waves (*Conveners*: Stefanie Komossa / Mauri Valtonen)
- Sp7: Science with present and future interferometric instruments (*Convener*: Jean Surdej)
- Sp8: Galactic molecular clouds and their chemistry (*Convener*: Mika Juvela)
- Sp9: Stellar dynamics and celestial mechanics in modern astrophysics (*Conveners*: Rainer Spurzem / Seppo Mikkola)
- Sp10: Chemo-dynamical galaxy evolution (*Convener*: Gerhard Hensler)
- Sp11: Rocks in our Solar System (*Convener*: Tomas Kohout)
- Sp12: A fresh look at the stellar initial mass function (*Convener*: Ignacio Ferreras)
- Sp13: Starburst galaxies now and then with ALMA (*Convener*: Jari Kotilainen)
- Sp14: LOFT, the large observatory for X-ray timing (*Convener*: Enrico Bozzo)
- Sp15: ESA
- Sp16: ESO

EWASS Special Meetings

SM1: EAS Council Meeting (private)
SM2: A lunch meeting with the affiliated societies (private)
SM3: EAS Council Meeting (private)
SM4: Plenary discussion on the ASTRONET Mid-Term Review
SM5: GREAT Meeting

EWASS Special Plenary Sessions and Talks

SpPt1: Plenary Talk: Tycho Brahe Prize Lecture
SpPt2: Plenary Talk: Merac prize Lecture
SpPt3: Plenary Talk: Lodewijk Woltjer Prize Lecture
SpPt4: Plenary Talk on ESA: TBA
SpPt5: Plenary Talk on ESO: TBA
SpPt6: Plenary session: EAS General Assembly
SpPt7: Plenary Talk: Grote Reber Prize Lecture

Important Deadlines

April 8 Registration with reduced fees
April 15 ASTRONET grant application
April 30 Abstract submission

More details are available at: <http://www.astro.utu.fi/EWASS2013>

IAU Symposium #304 “Multiwavelength AGN Surveys and Studies”



The **IAU Symposium #304 “Multiwavelength AGN Surveys and Studies”** will take place in Armenia on 7-11 Oct 2013. It will be the 5th IAU symposium and the 6th IAU meeting in Armenia (the previous ones: IAU Symp. 29 in 1966, IAU Symp. 121 in 1986, IAU Symp. 137 in 1989, IAU Symp. 194 in 1998 and IAU Coll. 184 in 2001).

AGN surveys are the source for the most interesting objects in the extragalactic Universe: QSOs, Seyfert galaxies, blazars, radio galaxies, LINERs, etc. They are important for understanding the variety of extragalactic sources and their interrelationship, as well as understanding the evolution of the Universe. Recent ground-based and space missions give vast amount of new multiwavelength (MW) data, which are being put together to discover many new AGN. A combined study of these data also gives the overall picture of the AGN and answers some of the most important questions: understanding possible evolutionary/physical connection between the different classes of AGN, the relation of AGN to their host galaxies, understanding the true fraction of heavily obscured AGN in order to determine the true AGN luminosity function and its variation

with redshift. The symposium is dedicated to B.E. Markarian's 100th anniversary, who was the first to conduct and accomplish a large-area spectroscopic survey to search for active galaxies.

Scientific Organizing Committee (SOC): Felix Aharonian (Ireland/Germany, Co-chair), Roger Blandford (USA), George Djorgovski (USA), Malcolm Longair (UK), Laura Maraschi (Italy), Enrico Massaro (Italy), Areg Mickaelian (Armenia, Co-chair), Felix Mirabel (France/Argentina), Ray Norris (Australia), Paolo Padovani (Germany), Bradley Peterson (USA), Elaine Sadler (Australia), David Sanders (USA, Co-chair), Helene Sol (France), Tadayuki Takahashi (Japan), Yervant Terzian (USA), Megan Urry (USA), Lutz Wisotzki (Germany).

Scientific Topics

- Historical surveys: spectral and colorimetric surveys for AGN, surveys for UV-excess galaxies
- AGN from IR/submm surveys
- AGN from radio/mm surveys
- AGN from X-ray/gamma-ray surveys
- Multiwavelength AGN surveys, AGN statistics and cross-correlation of MW surveys
- Unification and other models of AGN, understanding of the structure of nearby AGN
- AGN feedback in galaxies and clusters, AGN host galaxies and the AGN environments
- Binary AGN and Merging Super-Massive Black Holes
- Physics between AGN and microquasars
- Study of unique AGN and AGN variability
- Future large projects
- The Phenomena of Activity

Invited speakers and participants

Dave Alexander: *AGN in the distant galaxy population*

Paul Alexander (TBC): *Extragalactic radio sources*

Amy Barger: *Obscured AGN*

Bob Becker: *A Massive Sample of Radio Spectral Indices for AGN in the JVLA FIRST Survey*

Philip Best (TBC): *Observational aspects of AGN feedback in galaxies*

Roger Blandford: *The current state of our understanding of AGN and MBH formation*

Erin Bonning (TBC): *The multiwavelength variability of blazars (based on extensive optical/IR monitoring of Fermi-bright blazars)*

Andrea Comastri (TBC): *Obscured AGN and the X-ray background*

Francoise Combes: *AGN-galaxy formation and/or AGN feedback*

Darren Croton: *Simulations and modelling of feedback processes in galaxies*

Raffaele D'Abrusco: *Machine learning for QSO discovery in multi-wavelength spaces*

Ric Davies: *Imminent understanding of the structure of nearby AGN from IFUs*

George Djorgovski: *AGN discovery in observable parameter spaces*

Andy Fabian (TBC): *AGN feedback in galaxies and clusters*

Sandy Faber (TBC): *GOODS-CANDELS*

Gabriele Ghisellini (TBC): *Gamma-ray Blazars at high red-shift*

Paolo Giommi (TBC): *Correlations between MWL and HE emission in blazars*

Marcello Giroletti: *VLBI observations: the closest look at the cores of AGNs*

Eilat Glikman: *Dust Reddened Quasars*

George Helou: *Black Hole Growth and Star Formation: Modeling the Connection*

Joe Hennawi (TBC): *Binary QSOs*

Zeljko Ivezić: *Optical selection of quasars and AGNs: SDSS and LSST*

Ken Kellermann: *Relativistic Beaming in Blazars*

Lisa Kewley: *Photoionization, line emission diagnostics*

Yuri Kovalev: *Early results of AGN studies with the space VLB interferometer RadioAstron*

Nancy Levenson: *Compton thick AGN*
 Matthew Lister (TBC): *The link between VHE/HE properties and VLBI evolution from MOJAVE programme*
 Laura Maraschi: *High energy radiation of Blazars from X-ray to Gamma-ray*
 Chris Martin (TBC): *GALEX*
 Joe Mazzarella: *AGN and Starbursts in Dusty Galaxy Mergers: Insights from the Great Observatories All-sky LIRG Survey (GOALS)*
 Andrea Merloni (TBC): *eROSITA*
 Areg Mickaelian: *Markarian survey and Markarian galaxies*
 Felix Mirabel: *The accretion-ejection connection in black holes of all mass scales*
 Richard Mushotzky (TBC): *AGN in X-rays*
 Ray Norris: *The Evolutionary Map of the Universe (EMU) Survey*
 Paolo Padovani: *The AGN content of deep radio surveys and the radio-quiet / radio-loud dichotomy*
 Bradley Peterson: *Measuring the masses of black holes in AGNs*
 Vahe Petrosian: *Stochastic acceleration of electrons in compact objects*
 Huub Roettgering: *LOFAR surveys*
 Elaine Sadler: *Observational tests of radio-mode feedback in galaxies out to $z \sim 1$*
 Vicky Sarajedini: *Using AGN Variability Surveys to explore the AGN/Galaxy Connection*
 Nick Scoville: *COSMOS survey*
 Mike Skrutskie (TBC): *2MASS*
 Helene Sol: *Gamma-rays from blazars*
 Luigi Spinoglio: *Various selection criteria and their biases to pick up AGN from X-rays to radio*
 Daniel Stern: *Multi-wavelength AGN stuff from ground and space, from FIR to high-energy*
 Tadayuki Takahashi (TBC): *X-rays from AGN*
 Yervant Terzian, Edward Khachikian: *Galaxies with Binary Nuclei*
 David Thompson (TBC): *Insight into Fermi-based work and follow-up*
 Ezequiel Treister: *Multiwavelength AGN Population and the X-ray Background*
 Jane Turner (TBC): *Seyfert galaxies*
 Yoshihiro Ueda: *Evolution of X-ray Selected AGN*
 Megan Urry: *Cosmic growth of SMBH, from $z \sim 0$ to $z \sim 6$, and/or AGN feedback on galaxies, from $z \sim 0$ to $z \sim 2$*
 Sylvain Veilleux: *AGN feedback, near and far*
 Edward (Ned) Wright: *WISE*

So far, some 100 participants are in the list (<http://iaus304.aras.am/participantsn.html>).

Important Deadlines (<http://iaus304.aras.am/dates.html>)

| | |
|---------------|---|
| 30 Apr 2013 | Deadline for Early Online Registration and Abstract submission |
| 30 June 2013 | Final Submission of Abstracts of accepted papers for the Abstracts book |
| 7-11 Oct 2013 | IAU Symposium 304: Multiwavelength AGN Surveys and Studies |

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Areg Mickaelian, Co-chair of SOC and Chair of LOC, IAU Symp. #304

ICRANet DIRECTOR'S BOARD ANNUAL MEETING IN ITALY

Armenia participates in the International Centre for Relativistic Astrophysics Network



The International Centre for Relativistic Astrophysics Network (ICRANet, <http://www.icranet.org/>) held its Directors' Board (Governing Committee) annual meeting in Pescara (Italy) on February 25, 2013. All the member countries (Armenia, Brazil, Italy and Vatican) were represented on this meeting. The meeting was moderated by *Prof. Francis Everitt* of the Stanford University. The Committee has considered results of the last year activity and the budget of this year.

From Armenia, the Director of BAO *Dr. Haik Harutyunian* and the representative of the Ministry of Economics participated. For the first time Armenia was represented by two persons. It was dictated by some organizational issues connected with the Seat Agreement to be signed between the ICRANet and the Government of Armenia. As an international organization ICRANet should have some privileges and immunities which are granted, for instance, by governments of Italy and Brazil. At present an analogous Agreement is in the phase of discussion and preparation in the Ministry of Foreign Affairs of Armenia and should be presented to the National Assembly. For considering the financial aspects of this Agreement the representative of the Ministry of Economics was invited as well. The Armenian representatives reported about the organizational work which is going on with the Armenian National Academy of Sciences, the State Committee for Science and the Ministry of Foreign Affairs. The role of the Academy was emphasized which have given a room in the Institute of Mathematics to serve as a Headquarters of the ICRANet-Armenia.

The Centre was established in 2002 by Italy and Vatican, Armenia became its member in 2003, and Brazil joined the participating countries in 2011.

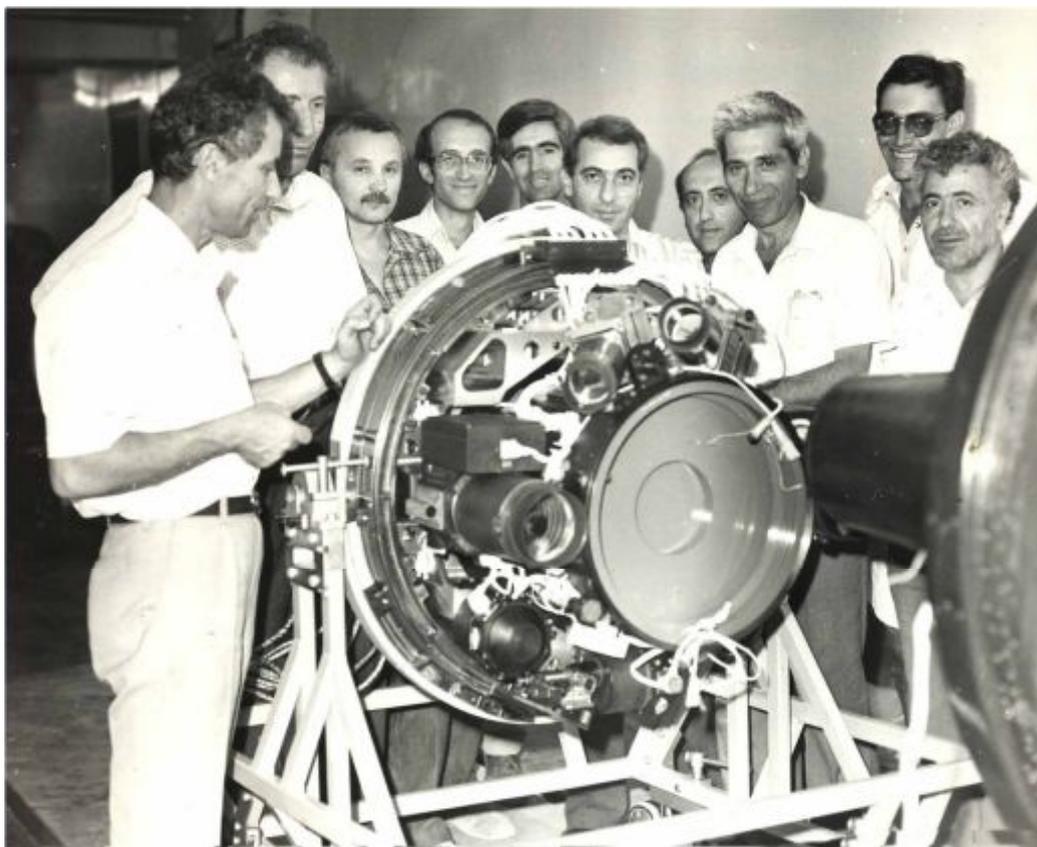
Haik Harutyunian

25th YEARS of the "GLAZAR" ABOARD the "MIR" SPACE STATION

"Glazar" Space Telescope was made at the "Granit" Special Construction Bureau under administrative guidance of Yu.M. Khodjayants. It was designed by the skilled professionals in the space technology M.N. Krmoyan, A.Z. Zakharian, A.L. Kashin. O.N. Gasparian, R.V. Isajanian. M.A. Mkrtchian from the Byurakan Astrophysical Observatory (BAO) and D. Hugueinin from the Geneva Observatory (Switzerland) also participated in the creation of the telescope. "Glazar" was designed for work at the module "Kwant" of the "Mir" Space Station. S.A. Savchenko, V.G. Rastorguev, V.V. Butov and S.I. Serova of "Energia" participated in the work on installment of "Glazar" at "Kwant" and its on-board functioning.

"Glazar" was 40 cm Ritchey-Cretien telescope with 1.3° field of view equal to 40 cm at the focal plane. The direction of the telescope was stabilized by two star trackers. The emission of the observed objects at 1640Å and width 250Å was magnified and transferred to the visible region by

the micro-channel intensifier and registered on the film. The exposed films were taken through the air-lock from the telescope installed outside of the module in the open space.



"Glazar" scientists and designers

The module "Kwant" was launched to the orbit on March 30, 1987 and in a couple of days attached to the "Mir" Space Station. Observations on the orbit have been made by different crews of the "Mir". Cosmonauts Yu.M. Romanenko, A.I. Laveikin, A.P. Alexandrov, V.G. Titov, M.Kh. Manarov, A.S. Viktorenko, A.A. Serebrov, A.A. Volkov and S.K. Krikalev made observations. The exposed films have been brought back to the Earth by the returning crew. The first film was taken back to the Earth in 1988. It showed that "Glazar" was functioning normally. The first paper describing "Glazar" was published 25 years ago in April 1988 in *Pis'ma v AZh (Soviet Astronomy Letters)*.

R.Kh. Hovhannessian, R.A. Epremian from BAO participated in planning of observations and reduction of observational data. In the reduction of some observational data participated also S.G. Navarro, O. Cardona, L.J. Corral of the INAOE, Puebla, Mexico.

Observations with "Glazar" have been carried out during 1987-1989. The areas of 14 OB stellar associations and of the LMC have been observed. Observations in the directions of the known OB associations have resulted in discovery of the existence of several groupings of OB stars along the line of sight. Especially many groups of OB stars were detected in the direction of stellar associations Vel OB1, Car OB1 and Cru OB1 located along the Carina spiral arm. By the "Glazar" observations it was shown that the progenitor of the supernova 1987A in LMC was the B type star. The image of the progenitor was absent on the "Glazar" photographs, though it should be brighter than the limiting magnitude of observations. It was found that star HD 269665 in LMC was very bright in 1987A and could be a FUOR. It also found several late type stars with hot components

that are very faint in visible continuum. Dust shells were detected around some early type stars. It was shown that the extinction law in the Carina nebula is abnormal.



BAO scientists with a group of Soviet cosmonauts in Byurakan

The results of the “Glazar” program have been published in 26 papers in *Afz*, *AZh*, *Pis'ma v AZh*, *Ap&SS*, *AJ*, *MNRAS*, *A&ASS*, and were reported in 5 international symposia. Over 100 references (excluding self-references) were made to these papers, the recent ones were made in 2012-2013.

In 1990, the improved version of the “Glazar”, Glazar-2 was launched to the “Mir”. On-board tests showed that after the launch all systems of the telescope function normally. Then cosmonauts checked the air-lock (the part of the module), replaced the film holder and at the end of this operation the handle of the air-lock broken. It was repaired after 1.5 years. The returned film showed that the detector was not functioning. It was found out that the reason was that after the film holder replacement the detector was not fixed at its proper position. We were able to change the detector. We had new micro-channel intensifier. It was necessary to install it in the proper box and to send it to “Mir” for replacement. However, at that time the USSR collapsed, the “Granit” SCB became under the Armenian govern, and new directorship of the “Granit” forbidded to make the needed work. Thus, the fully operating telescope did not made any observation.

Prof. Hrant Tovmassian, Principal Investigator of “Glazar”

SCIENCE in BYURAKAN. STUDY of SUPERNOVAE and THEIR HOST GALAXIES at the BYURAKAN ASTROPHYSICAL OBSERVATORY

Studies of **Supernovae (SNe) and their host galaxies** started at the Byurakan Astrophysical Observatory (BAO) about 25 years ago in collaboration with other groups in Europe and USA. During this period, many refereed articles have been published in international leading journals and presented at more than 20 international meetings, colloquia, and seminars. Now, the Armenian group is supervised by leading research associate **Dr. Artashes Petrosian**. SNe and their host galaxies have been the subject of the PhD thesis of **Dr. Artur Hakobyan** (defended in 2009), and of current research of PhD students **Levon Aramyan** and **Tigran Nazaryan** (in part). In addition, two master students **Arpine Karapetyan** and **Lilit Barkhudaryan** now are working on their master theses and in the near future will fully join to the group. Armenian scientists have led several of international collaborative papers and during last five years received national (e.g., ANSEF 2010, 2011, and 2013) and international (e.g., Collaborative Bilateral Research Project of the State Committee of Science of the Republic of Armenia and the French Centre National de la Recherche Scientifique 2010-2011 and 2012-2013, ICTP Associateship 2013-2018) grants. The published papers have high reputation and are among the most cited papers by BAO scientists.

The most important aim of our research is to understand the nature of different types of SN progenitors via correlations of SNe properties with the local (metallicity, locations and associations with spiral arms and HII regions etc.) and global parameters (morphology, star-formation rate, luminosities, host environment etc.) of galaxies, as well as with host nuclear properties (activity class, metallicity, stellar population etc.).

Below we present important results obtained by the group:

1. The radial distributions of Core-Collapse (CC) SNe in galaxies located in different environments are similar. SNe discovered in paired galaxies do not favor a particular direction with respect to the companion galaxy. In addition, the azimuthal distributions inside the host members of galaxy groups are consistent with being isotropic. The fact that SNe are more frequent in the brighter components of the pairs and groups is expected from the dependence of the SN rates on the galaxy luminosity (*Petrosian & Turatto, A&A, 297, 49, 1995; Navasardyan et al., MNRAS, 328, 1181, 2001*).
2. The distribution of SNe in active and star-forming galaxies shows a higher concentration toward the center of the active host than is the case for normal host galaxies, and this effect is more pronounced for CC SNe (*Petrosian et al., AJ, 129, 1369, 2005*), particularly for type Ib/c (*Hakobyan, Ap, 51, 69, 2008*). The radial distances of types Ib/c and II SNe, from the nuclei of their host galaxies, is larger for barred spiral hosts (*Petrosian et al., AJ, 129, 1369, 2005; Hakobyan et al., A&A, 508, 1259, 2009*). The normalized radial distribution of all CC SNe is consistent with an exponential law, as previously found, with a possible depletion of CC SNe within one-fifth of the isophotal radius (*Hakobyan et al., A&A, 508, 1259, 2009*). CC SNe are concentrated in spiral arms and are often close to or in the HII regions, whereas type Ia SNe show only a loose association with spiral arms and no clear association with HII regions (*Petrosian et al., AJ, 129, 1369, 2005*).
3. We compute the rate of SNe of different types along the Hubble sequence normalized to the optical, near-infrared luminosity and to the stellar mass of the galaxies (*Mannucci et al., A&A, 433, 807, 2005; Hakobyan et al., Ap, 52, 40, 2009*). We find that the rates of all SN types, including Ia, Ib/c and II, show a sharp dependence on both the morphology (Fig. 1) and the

colors (Fig. 2) of the galaxies and, therefore, on the star formation activity. In particular, that the type Ia rate in late type galaxies is a factor ~ 20 higher than in E/S0. Similarly, the type Ia rate in the galaxies bluer than $B-K = 2.6$ is about a factor of 30 larger than in galaxies with $B-K > 4.1$ (Mannucci et al., A&A, **433**, 807, 2005). We find that the normalized rates show no modulation with nuclear activity or environment (Hakobyan et al., Ap, **54**, 301, 2011). These findings can be explained by assuming that a significant fraction of Ia events in late spirals/irregulars originates in a relatively young stellar component.

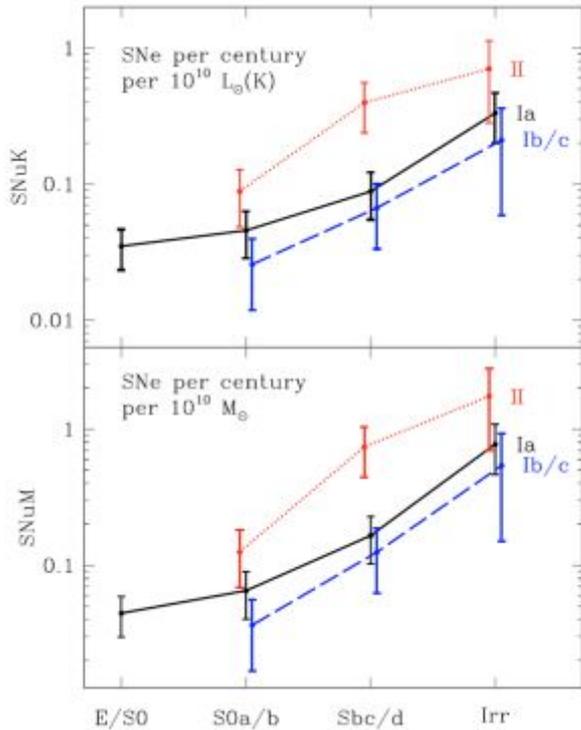


Fig. 1. *Upper panel:* SN rate per K band luminosity as a function of morphological index expressed in SNUK (number of SN per century per $10^{10} L_{\text{Sun}}$ of luminosity in the K band). The lines correspond to type Ia (solid), type II (dotted), and Ib/c (dashed). *Lower panel:* SN rate normalized to the stellar mass and expressed in SNUM, i.e., number of SNe per century per $10^{10} M_{\text{Sun}}$ (from Mannucci et al. 2005).

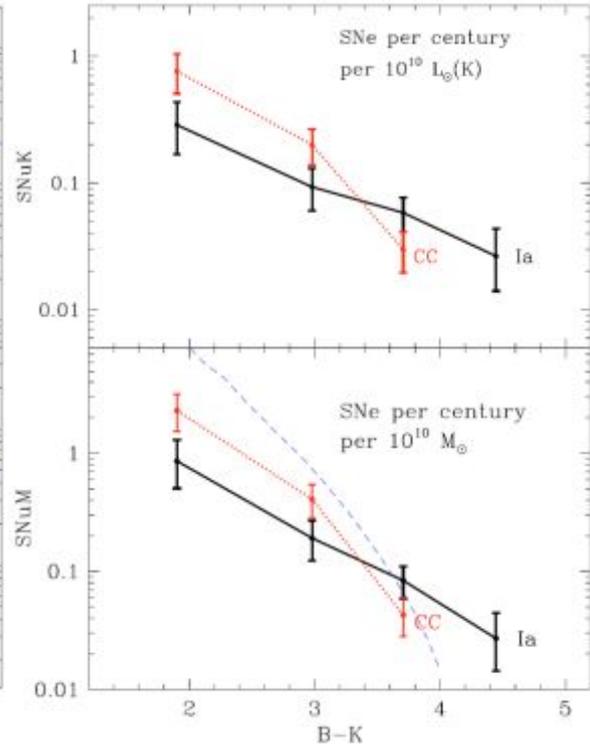


Fig. 2. *Upper panel:* SN rate per K band luminosity expressed in SNUK as a function of the $B-K$ color of the galaxies. The thick lines are the results for type Ia (solid) and CC (dotted). *Lower panel:* SN rate normalized to the stellar mass and expressed in SNUM. The thin dashed line shows the relation between the $B-K$ color and the CC SN rate as predicted from a model of spiral galaxy (from Mannucci et al. 2005).

4. It is widely accepted that the progenitors of CC SNe are young massive stars and therefore their host galaxies are mostly spiral or irregular galaxies dominated by a young stellar population. Surprisingly, among morphologically classified hosts of CC SNe, we find 22 cases where the host has been classified as an E or S0 galaxy. To clarify this apparent contradiction, we carry out a detailed morphological study and an extensive literature search for additional information on the sample objects. We find that 19 of the host galaxies are misclassified star-forming galaxies, and the remaining three ellipticals show evidence for star formation via LINER activity and galaxy interaction (Hakobyan et al., A&A, **488**, 523, 2008). One of these three SNe, SN 2005md, initially classified as a probable young type IIb SN, was shown to be in fact a new Galactic cataclysmic variable. However, investigating the properties of SNe and their host galaxies in the SDSS DR8 (Hakobyan et al., A&A, **544**, A81, 2012), we found additional two cases in which the host has been classified as E or S0 (Fig. 3). These results confirm the presence of a limited, but significant, number of CC SNe in galaxies generally classified as early-type.

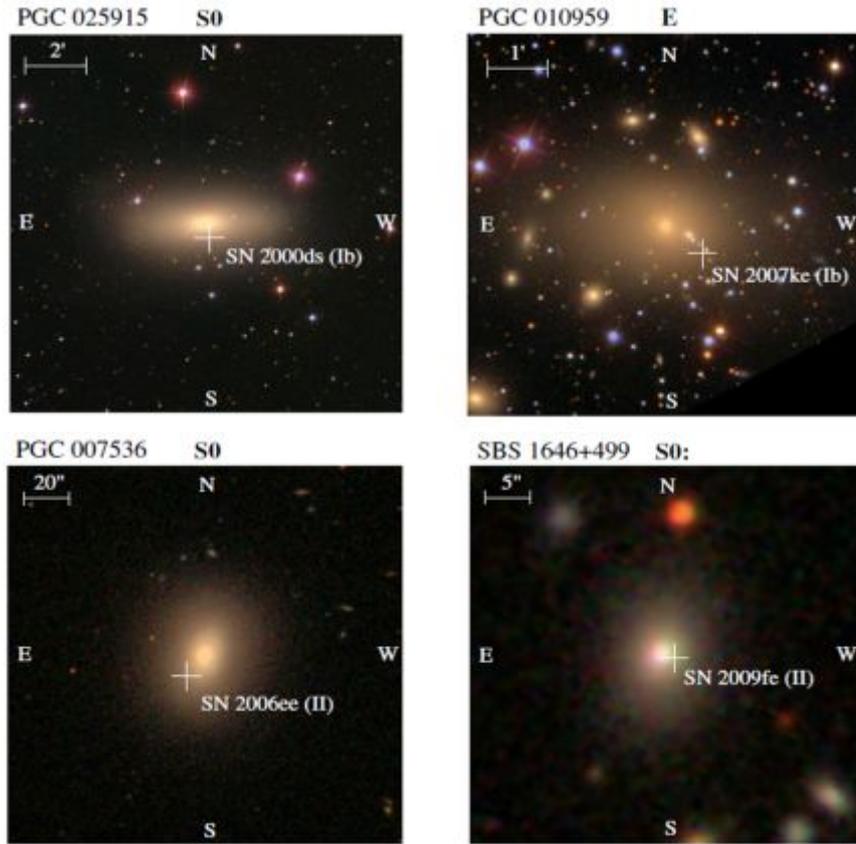


Fig. 3. SDSS images of early-type (E or S0) host galaxies with CC SNe (from *Hakobyan et al.* 2012).

- In *Hakobyan et al.* (A&A, **544**, A81, 2012), we report the creation of large and well-defined database that combines extensive new measurements and a literature search of 3876 SNe and their 3679 host galaxies located in the sky area covered by the SDSS DR8. This database should be much larger than previous ones, and should contain a homogenous set of global parameters of SN hosts, including morphological classifications and measures of nuclear activity. The measurements of apparent magnitudes, diameters, axial ratios, and position angles of SN host galaxies were made using the images extracted from the SDSS *g*-band. For each host galaxy, we analyzed RGB images of the SDSS to accurately measure the position of its nucleus to provide the SDSS name. With these images, we also provide the host galaxy's morphological type, and note if it has a bar, a disturbed disk, and whether it is part of an interacting or merging system. In addition, the SDSS nuclear spectra were analyzed to diagnose the central power source of the galaxies. Special attention was paid to collect accurate data on the spectroscopic classes, coordinates, offsets of SNe, and heliocentric redshifts of the host galaxies. We analyze and discuss many selection effects and biases that can significantly affect any future analysis of our sample.

During 2013, we plan to publish several research papers concerning the nature of unconfirmed SNe (*Aramyan et al.*, Ap, 2013, in press), paired galaxies with different activity levels and their SNe (*Nazaryan et al.*, ApSS, 2013, submitted), the links between SNe frequencies and hosts activity level (*Hakobyan et al.*, A&A, 2013, in preparation), distribution of SNe in AGN host galaxies (*Hakobyan et al.*, A&A, 2013, in preparation), and distribution of SNe relative to spiral arms and star-forming regions (*Aramyan et al.*, A&A, 2013, in preparation).

Dr. Artur A. Hakobyan, Research associate, BAO

PLANETARY TRIPLE CONJUNCTIONS LIST on ArAS WEBPAGE



The full list of Triple Conjunctions of the Solar System Planets for 2001-2050 is now available at ArAS webpage "Calendar of Events" menu. The period is selected to make available triple conjunctions in the near past and in the near future observable for the present generations. The conjunctions are given for Mercury, Venus, Mars, Jupiter, Saturn, Uranus and Neptune. Altogether, 72 conjunctions are given in the list having 0.4°-8.6° distances between the planets. Only in case of 4 conjunctions (in 2029, 2035, 2048 and 2049) 3 planets will appear within 1°. On May 27, 2013 Mercury, Venus and Jupiter will appear within 2.43°. This is the only triple conjunction in 2013.

The list of conjunctions is available at: <http://aras.am/Calendar/conjunctions.htm>

PERIODIC COMETS LIST on ArAS WEBPAGE



The full list of Periodic Comets is now available at ArAS webpage Calendar of Events menu. There are 470 periodic comets given in the list. The periods of these comets are from 3.3 (Encke 1) to 364.5 (Ikeya – Zhang 1) years. In average, some 40-50 periodic comets pass through the inner Solar System every year. In 2013 44 comets will pass close to the Sun and most of them will be visible even with small telescopes. About every decade or so, a comet becomes bright enough to be noticed by naked eye. In

Nov-Dec 2013, we expect a very bright comet C/2012 S1 ISON (*International Scientific Optical Network*) that was discovered last September by Russian amateurs Vitali Nevski and Artyom Novichonok. At the time, it was farther than Jupiter and impossibly faint, but once ISON's orbit was determined, astronomers realized the comet would pass only 1.1 million miles from the center of the Sun (680,000 miles above its surface) on November 28, 2013. However, predicting whether a comet will become a great comet is notoriously difficult, as many factors may cause a comet's brightness to depart drastically from predictions. For example, Comet Kohoutek in 1973 fulfilled all the criteria and was expected to become spectacular, but failed to do so, and Comet West, which appeared three years later, had much lower expectations (perhaps because scientists were much warier of glowing predictions after the Kohoutek fiasco), but became an extremely impressive comet. The late 20th century saw a lengthy gap without the appearance of any great comets, followed by the arrival of two in quick succession – Comet Hyakutake in 1996, followed by Hale-Bopp, which reached maximum brightness in 1997 having been discovered two years earlier. The first great comet of the 21st century was C/2006 P1 (McNaught), which became visible to naked eye observers in Jan 2007. It was the brightest in over 40 years.

The list of Periodic Comets is available at: <http://aras.am/Calendar/comets.htm>

ArASNews REFERENCE LIST on ArAS WEBPAGE

The reference list of the articles published in 60 ArAS Newsletters (ArASNews) in 2002-2012 is already available at ArAS webpage. The articles are available according to their content and subject and are devoted to the International meetings held in Armenia (54), Summer schools for young astronomers held in Armenia (20), Participation of Armenian astronomers in international meetings (35), Participation of young Armenian astronomers in international summer schools (11), Viktor Ambartsumian International Prize (10), Armenian National Science and Education Fund (ANSEF) grants (13), ArAS Annual prize for young scientists (25), Other ArAS and Armenian astronomers awards (18), International astronomy awards (7), Byurakan Astrophysical Observatory (BAO) news (13), Scientific and review papers (27), Announcements, news, and other info (35), Publication of books and other materials (16), New menus on ArAS webpage (10), Release of other newsletters (7), Astronomical education matters (18), Mass media and Scientific journalism (5), Anniversaries of Armenian and other astronomers (104), Obituaries (8) and other ArAS affairs (31). The users can handle these articles easily and can read altogether 467 articles devoted to the Armenian and international astronomy.

Reference list of ArASNews articles

International meetings held in Armenia

| | |
|---|---------------------------------|
| IAU Symposium #304 "Multiwavelength AGN Surveys and Studies", Yerevan, 2013 | ArASNews 50, 59, 55 |
| AstroBooks Exhibition, Byurakan, 2012 | ArASNews 59 |
| Anania Shirakatsi – 1400 Meeting (combined with ArAS X Annual Meeting), Byurakan, 2012 | ArASNews 58, 59 |
| ANSEF Forum, Yerevan, 2012 | ArASNews 58, 59 |
| Young Scientists Conference "50 years of Cosmic Era", Yerevan, 2011 | ArASNews 52, 51 |
| Oskanian-90 / Ioannissian-100 seminar, Byurakan, 2011 | ArASNews 51 |
| ArAS X Annual Meeting, Byurakan, 2011 | ArASNews 52, 51 |
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| Workshop on Grid infrastructures, Byurakan, 2009 | ArASNews 34 |
| French-Armenian Workshop, Byurakan, 2009 | ArASNews 34, 33, 32 |
| ArAS VII Annual Meeting, Byurakan, 2009 | ArASNews 33, 32, 31, 30, 29 |
| Markanian's 95th anniversary meeting, Byurakan, 2008 | ArASNews 28 |
| Ambartsumian's 100th anniversary meeting combined with ArAS VII Meeting, Byurakan, 2008 | ArASNews 27, 26, 25 |
| JENAM-2007 (combined with ArAS VI Annual Meeting), Yerevan, 2007 | ArASNews 23, 22, 21, 20, 19, 15 |
| BAO-60 meeting combined with ArAS V Annual Meeting, Byurakan, 2006 | ArASNews 19, 18, 17, 16 |
| ArAS IV Annual Meeting, Byurakan, 2005 | ArASNews 16, 15 |
| German-Armenian Workshop on Astrophysics, Byurakan, 2005 | ArASNews 13 |
| ArAS III Annual Meeting, Byurakan, 2004 | ArASNews 11, 11, 10, 9 |
| Byurakan-Abastumani Colloquium (combined with ArAS II Annual Meeting), Byurakan, 2003 | ArASNews 8 |
| ArAS I Annual Meeting, Byurakan, 2002 | ArASNews 3, 4, 2, 1 |

Last updated: January 23, 2013.

The Reference List is available at: <http://www.aras.am/ArasNews/arasnewsreference.html>