

## **Enclosure 2**

### **Activities of the ICRA<sup>Net</sup> Armenia Centre**



# ICRANET ARMENIA SEAT

# Summary

Introduction	pp 3-4
The entrance of Armenia	pp 5-6
ICRANet Armenia Seat agreement	pp 7-12
Scientific Activity	p 13
Markarian Multiwavelength data center	pp 14-15
Collaboration with other institutes and universities	pp 16-17
Recent Publications	pp 18-29
The Fifth Zeldovich meeting	pp 30-34
Visit of Ambassador of Italy	pp 35-36
Narek Sahakyan awarded Doctor of Science	pp 37
David Israelyan and Gevorg Israelyan PhD thesis	pp 38-39
Meeting with the president of the Republic of Armenia	pp 40-41
Meeting with the Foreign Minister of the Republic of Armenia	pp 42-43
Meeting with the President of the National Assembly of Armenia	p 44
Armenian Italian Science day	pp 45-47
1 st Scientific ICRANet Meeting in Armenia: Black Holes: the largest energy sources in the Universe	pp 48-50
MAGIC collaboration meeting	pp 51-53
Visit to Iran	pp 54-56



# *Introduction*

The state members of ICRANet international organization are the states of Armenia, Brazil, Italy, the Vatican City State, as well as ICRA, the University of Arizona and the Stanford University. The ICRANet Armenia seat is in the Presidium of the National Academy of Sciences of the Republic of Armenia (NAS RA) since January 2014: it is among more than 34 scientific institutions and other organizations which are included in the Presidium of the Academy. In Armenia, the ICRANet centre effectively collaborates with other scientific institutions from the Academy and Universities which includes organizing joint international meetings/workshops, summer schools for PhD students and mobility programs for scientists in the field of Astrophysics. ICRANet centre in Armenia can play a strategic role for the ICRANet activities in the area of central-Asian and middle-Eastern countries. In 2014, the government of the Republic of Armenia approved the agreement to establish ICRANet international centre in Armenia. The seat agreement was signed in Rome on 14 February 2015 by the director of ICRANet Prof. Remo Ruffini and the ambassador of Armenia in Italy Mr. Sargis Ghazaryan. On 13 November 2015, the Parliament of the Republic of Armenia unanimously approved the Seat Agreement. With this status, the Seat in Yerevan will contribute to the development of Relativistic Astrophysics in Armenia and will give to Armenian researchers the possibility to participate in the international programs implemented by ICRANet.



# Current members of the group



Dr. Narek Sahakyan  
Period 2014-

## Scientists



Dr. Sargis Gasparyan  
PhD student: 2016-2019  
postdoc: 2019-



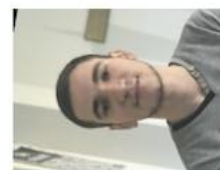
Gevorg Harutyunyan  
MS student: 2018-2020  
PhD student: 2020-



Mher Khachatryan  
BC student: 2018-2021  
MS student: 2021-



Dr. David Israyelyan  
MS student: 2018-2020  
PhD student: 2020-2022  
postdoc: 2022-



Manvel Manvelyan  
PhD student: 2022-



Yavgen Vardanyan  
ML specialist: 2020-

## Administration



Iveta Hakobyan  
Secretary: 2018



Gurgem Petrosyan  
system administrator: 2014-



Sofia Petrosyan  
Accountant: 2019-

# *The entrance of Armenia*

DA : AMB. REP. ARMENIA, ROMA

N. FAX : 39063297763

30 Ott. 2003 12:57 P2



ՀԱՅԱՍՏԱՆԻ ՀԱՆՐԱՊԵՏՈՒԹՅԱՆ ԴԵՄՊԱՆՈՒԹՅՈՒՆ  
AMBASCIATA DELLA REPUBBLICA D'ARMENIA

Via dei Colli della Farnesina, 174 00194-Roma  
tel. (+39) 06 3296638 fax (+39) 06 3297763 E-mail: embarmat@tin.it

The undersigned Ambassador Gaghiik Baghdassarian hereby declares the ratification on the part of the Republic of Armenia, by Presidential decree no. 141, of the Agreement on the Establishment of International Network of Centres for Relativistic Astrophysics, entitled ICRANET, signed on June 12, 2003, in Rome, by Ambassador Gaghiik Baghdassarian, on behalf of the Republic of Armenia.

By means of the present, the undersigned Ambassador Gaghiik Baghdassarian, has the honour to delegate Prof. Vahe G.Gurzadyan, as representative of the Republic of Armenia to the Steering Committee of ICRANET.

In witness whereof the undersigned Ambassador Gaghiik Baghdassarian has signed the present act and affixed thereto his seal.

Rome, October 30, 2003

Ambassador  
Gaghiik Baghdassarian



ՀԱՅԱՍՏԱՆԻ ՀԱՆՐԱՊԵՏՈՒԹՅԱՆ ԱՐՏԱԹԻՆ ԳՈՐԾԵՐԻ ՆԱԽԱՐԱՐՈՒԹՅՈՒՆ  
MINISTRY OF FOREIGN AFFAIRS OF THE REPUBLIC OF ARMENIA

DATA ARRIVO	23/10/12
REGISTRATO	ICRANET
PROT. N°	707

Yerevan, October 22, 2012

7/12290

PROFESSOR REMO RUFFINI  
DIRECTOR OF ICRANet

Pescara

Dear Professor Ruffini,

Thank you for your letter of 11 July 2012, on the opening of ICRANet Center in Yerevan. We welcome your initiative and look forward to cooperating closely with ICRANet and rendering support to the establishment of the Center in Yerevan.

As a member-state of ICRANet, Armenia may provide the Center with privileges and immunities by signing a respective agreement on the status of the Center.

I avail myself of this opportunity to wish you every success in your future activities.

Sincerely,

ZOHRAB MNATSAKANIYAN  
DEPUTY MINISTER



# *Seat agreement*

In 2014, the Government of the Republic of Armenia approved the agreement to establish the ICRANet international center in Armenia. The seat agreement has been signed in Rome on February 14, 2015 by the director of ICRANet, Remo Ruffini and the ambassador of Armenia in Italy, Mr. Sargis Ghazaryan. On November 13, 2015 the Parliament of the Republic of Armenia unanimously approved the Seat Agreement



## AGREEMENT

### BETWEEN THE GOVERNMENT OF THE REPUBLIC OF ARMENIA AND THE INTERNATIONAL CENTER FOR RELATIVISTIC ASTROPHYSICS NETWORK (ICRANET) ON THE ESTABLISHMENT OF ICRANET CENTER IN THE REPUBLIC OF ARMENIA

**The Government of the Republic of Armenia**

and

**The International Center for Relativistic Astrophysics Network (ICRANet),**  
Jointly referred to as “Parties”,

**Wishing** to develop and strengthen the cooperation between the Republic of Armenia and ICRANet to promote research, training and education in the field of relativistic astrophysics;

**Aiming** to involve scientists and professionals of the Republic of Armenia in the activities organized and implemented by ICRANet and in trainings at post-graduate and post-doctoral levels as well as to promote joint implementation of exchange programs;

**On the basis** of the Agreement on the Establishment of the International Center for Relativistic Astrophysics Network, signed on June 12, 2003;

Hereby agreed on the establishment of ICRANet Center, in the system of the National Academy of Sciences of the Republic of Armenia, with the terms and conditions of functioning as stated hereunder:

#### Article 1

Within the purposes of the present Agreement:

- a. “Government” stands for the Government of the Republic of Armenia;
- b. “Center” stands for the International Center for Relativistic Astrophysics Network (ICRANet Center), which is established in the system of the National Academy of Sciences of the Republic of Armenia and located in the main building of the Institute of Geological Sciences (address: 24A, Marshall Baghramyan Avenue, Yerevan 0019, Republic of Armenia).
- c. “ICRANet” stands for the International Center for Relativistic Astrophysics Network;
- d. “Statutory Agreement” stands for the Agreement on the Establishment of the International Center for Relativistic Astrophysics Network (ICRANet);
- e. “Statute” stands for the Statute of ICRANet, attached to the Statutory Agreement.
- f. “Property” stands for real estate, furniture, vehicles, rights, assets in any



- currency, credits, income, other assets and everything that may constitute the patrimony of Center;
- g. "Files" stands for the correspondence, manuscripts, audio-visual material of any kind, as well as all other documents belonging to Center or in its possession;
  - h. "Staff" stands for the employees of the Center, who are not nationals of the Republic of Armenia, nor have permanent resident status in the Republic of Armenia;
  - i. "Local staff" stands for the employees hired by the Center in the territory of the Republic of Armenia for the performance of administrative duties or services.

#### **Article 2**

1. Within the framework of the present Agreement, in compliance with the Statutory Agreement and the legislation of the Republic of Armenia the Center as a research institution is established. In accordance with the provisions of Article 2 of the Statute the Center shall implement ICRANet mission in the Republic of Armenia by supporting and supplementing national efforts in the areas of research, training and education in the field of relativistic astrophysics.

2. Within the scope of its activities the Center shall be responsible for developing, coordinating and supporting cooperation between the Government and ICRANet, as well as promoting the development of relativistic astrophysics with academic community and civil society. ICRANet may support to the development of country studies and research programs with the participation of Armenian research institutions and universities by providing high quality services and mobilizing resources for the financing of projects, as well as other activities prescribed by Article 3 of the Statutory Agreement.

#### **Article 3**

1. In conformity with Article 1 of the Statute, the Center shall have legal personality and shall have the capacity to conclude contracts, to acquire and dispose movable and immovable Property, to open legal proceedings, bank accounts in local and foreign banks in national and foreign currency and to possess them.

2. In terms of scientific activity the Center shall remain under the authority and responsibility of ICRANet. With respect to issues on labor, sanitary and other requirements the norms deriving from the legislation of the Republic of Armenia shall be applied.

3. The premises of the Center shall not be used for the purposes not compatible with the functions of ICRANet.

#### **Article 4**

1. The budget of the Center is composed from contributions of the Parties.

2. The Contributions of the Government to the Center will be made annually as part of general means provided by the budget of the Republic of Armenia for scientific and technological activities.

3. ICRANet will make its own contributions to the budget of the Center by implementing annual mobility programs for researchers of the Center aimed at visits to other ICRANet Centers and exchange of best practices, by supplying computer facilities with the aim to establish scientific data base in the Center and transfer data from ground and space based observatories.

4. Insurance of the premises and equipment of the Center will be covered by the Armenian Party. The insurance for the equipment obtained for the Center by ICRANet shall be covered by ICRANet.

5. The Center will cover part of its expenses from its own budget, including organization of visits, communication services, information technologies and programs, as well as office supplies and expenses related to restoration of equipments and technical assistance. From the annual means provided by the budget of the Republic of Armenia for scientific and technological activities, the Government will also ensure communal services and security of the premises in conformity with the protection regime of the building.

6. Necessary internal renovations may be made in the premises of the Center provided that no structural elements of the building are changed.

#### **Article 5**

1. The Ministry of Education and Science of the Republic of Armenia will establish a Governing Board in order to coordinate the activities of the Center. The Director of ICRANet is the Chair of the Governing Board. Other members will include one member from ICRANet Governing Board, one member from ICRANet Scientific Committee, the Chairman of the State Committee of Science of the Ministry of Education and Science of the Republic of Armenia, the President of the National Academy of Sciences of the Republic of Armenia and one representative from the Ministry of Foreign Affairs of the Republic of Armenia.

2. The Governing Board shall approve:

- short and long-term scientific development programs and reports;
- reports on the Center's annual activity;
- programs on training and retraining the scientific personnel;
- reports on the results of the Center's participation in major scientific programs;
- projects and other forms of collaboration;
- annual program on organization and participation in scientific events, including conferences, workshops, schools for young scientists;
- the structure of the Center;
- Statute of the Center, as well as its amendments;

The Governing Board shall supervise over the execution process of its resolutions, and realize other authorities related to the activities set in paragraph 2 of Article 3 of the Statute.

#### **Article 6**

1. The Center shall have a Director, appointed by the Governing Board, which, in the performance of his/her duties, shall:

- act as accredited representative of ICRANet in the Republic of Armenia;



- promote ICRANet's services in the Republic of Armenia;
  - develop a strategic framework of cooperation, an annual work program, active partnerships between the Government and ICRANet, academic community, civil society, non-governmental organizations;
  - lead and coordinate the overall program and project development and mobilize related financial resources;
  - support and monitor the implementation of ICRANet projects and programs, and contribute to the management of all other ICRANet activities in the Republic of Armenia.
  - take the responsibility for general supervision of the premises and the equipment of the Center.
2. The Center's Local staff shall be hired in conformity with the legislation of the Republic of Armenia on labor and social security.

#### **Article 7**

The Center, its buildings and files shall be inviolable. Properties belonging to ICRANet in the Republic of Armenia shall be exempt from requisition, confiscation or sequestration and expropriation, besides the use for public purposes as defined by the legislation of the Republic of Armenia.

#### **Article 8**

1. The Government shall finance customs duties for the import of facilities, equipments, computers and co-finance the articles and publications intended for the Center's scientific and scientific-technical activities. The imported goods shall not be traded in the Republic of Armenia without Government's authorization.

2. The Center will be exempted from custom duties and any other taxes for the import of two vehicles and their spare parts. The vehicles will be registered with special series distributed to the vehicles of diplomatic missions and international organizations accredited in the Republic of Armenia. Fuel and lubricant necessary to those vehicles could be bought or imported without paying duties, in the limits fixed for other international organizations present in the Republic of Armenia.

#### **Article 9**

The Center's staff and its Properties shall enjoy immunity of jurisdiction and execution in the territory of the Republic of Armenia, except:

1. in case of express renunciation, through its Director;
2. in case of a labor or social security related suit initiated by an employee or a former employee of the Center;
3. in case of a civil suit initiated by a third party for damages, injury or death resulting from accident caused by a vehicle belonging or used on behalf of the Center;
4. in case of a traffic violation involving a vehicle belonging to the Center or used on its behalf;
5. in case of a countersuit directly related to a court suit initiated by the Center.

**Article 10**

1. ICRANet will be responsible for all the injuries and prejudices caused by its activities in the Republic of Armenia.
2. ICRANet will take the Government away from any indemnification requests for damages caused to third parties.
3. ICRANet will stipulate an insurance to cover any civil responsibility to third parties, in order to assure itself from possible damages caused while performing its activities.

**Article 11**

Any dispute concerning the interpretation or the application of the provisions of the present Agreement will be settled through negotiations and consultations between the Parties.


**Article 12**

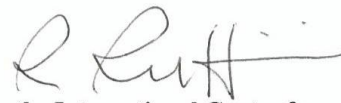
The Parties may, by mutual consent, introduce amendments and supplements to this Agreement by separate records. The latter shall come into force in conformity with the procedure set forth by the present Agreement and shall be considered as part of the it.

**Article 13**

1. The present Agreement shall come into force on the date of receipt of the last written notification of the Parties via diplomatic channels, certifying the fulfillment of the internal procedures necessary for such entry into force.
2. This Agreement is concluded for indefinite period. Any of its Parties may notify the other of its intention to denounce this Agreement. Termination shall become effective six (6) months after the date of receipt of the notification from the other Party.

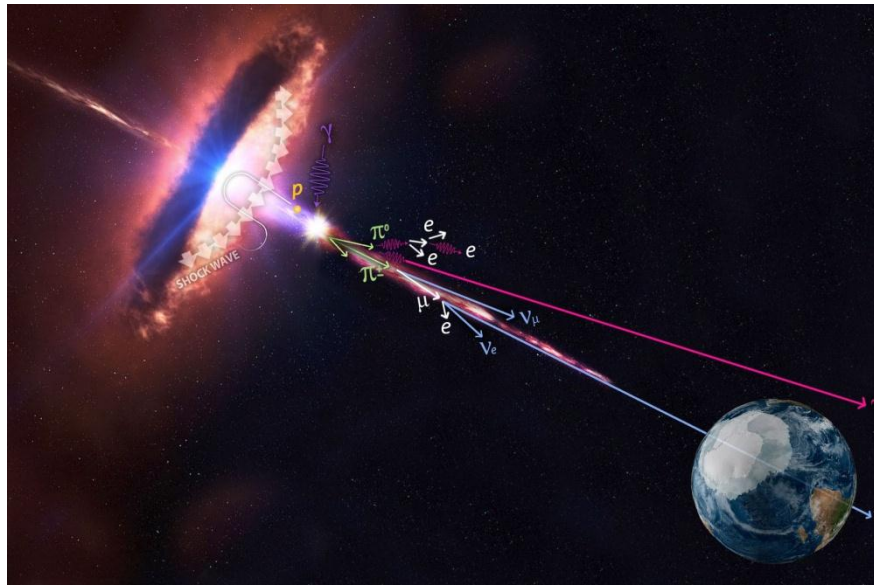
Done at Yerevan, on 13. February 2015, in duplicate in Armenian and English languages, both texts being equally authentic. In case of divergences between the texts, the English text shall prevail.

  
**For the Government of  
the Republic of Armenia**

  
**For the International Center for  
Relativistic Astrophysics Network**

# *Scientific activity of ICRA Net in Armenia*

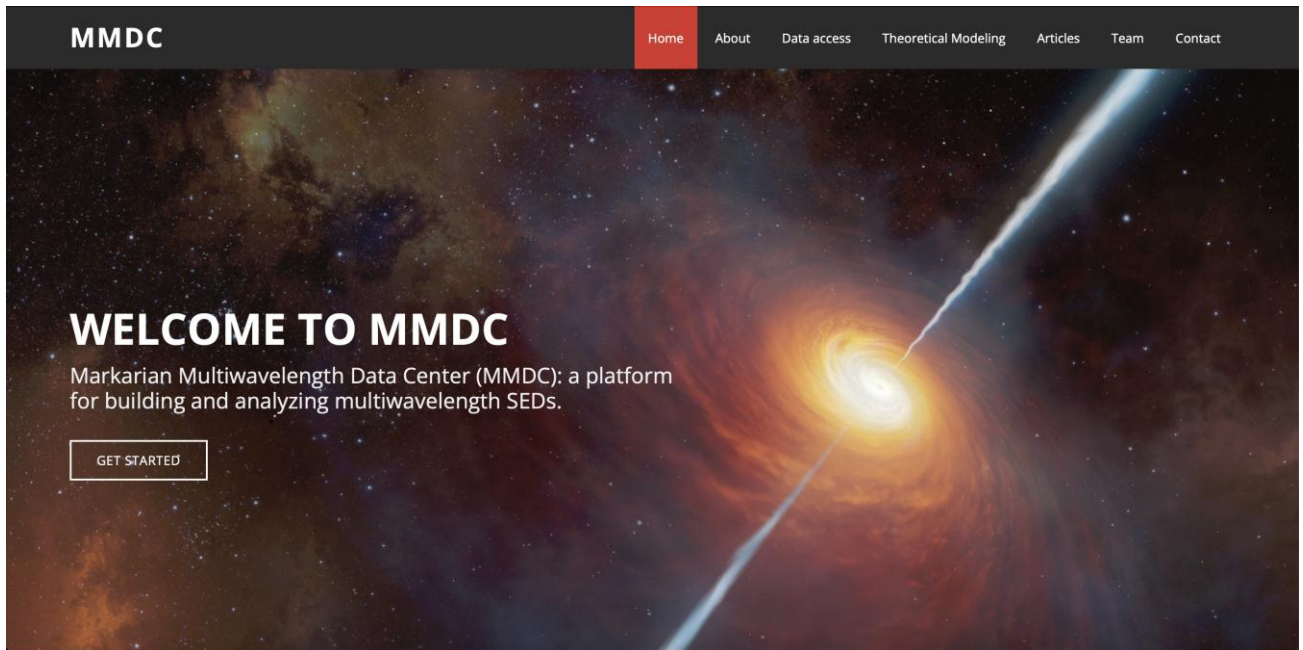
The main scientific activities of ICRA Net-Armenia are in the field of X- and gamma-ray Astrophysics and Astroparticle Physics. The results from the data analysis of Swift/NuStar, Chandra and Fermi Large Area Telescope (Fermi LAT) telescopes are used to investigate the particle acceleration and emission processes in the radio galaxies and blazars. The analysis of available data, allows to explore the emission processes and relativistic outflows in the most extreme regimes (keV-TeV). Also, the production and propagation of ultra-high-energy neutrinos from binary systems and active galactic nuclei are investigated.



Blazars are the class of radio-loud active galactic nuclei (AGN) whose relativistic jets are oriented close to the line of sight of the observer. Blazars are emitting electromagnetic radiation ranging from radio to high-energy (HE;  $>100$  MeV) and very high energy (VHE;  $> 100$  GeV) gamma-ray bands characterized by rapid and high-amplitude variability. Blazars are also potential sources for VHE neutrino emission. The research focus of the group is to investigate the origin of broadband emission from blazars, using multiwavelength and multimessenger data, and it includes a variety of topics, such as the disk - jet connection, relativistic jet physics, particle acceleration, and emission, etc.



# *Markarian Multiwavelength data center*



MMDC is an innovative platform that facilitates comprehensive research on blazars by building and analyzing multiwavelength Spectral Energy Distributions (SEDs).

Blazars are a subtype of active galactic nuclei with relativistic jets directed almost exactly towards Earth. As powerful, long-lived extragalactic objects, they offer a unique window into the processes around supermassive black holes and the distant universe.

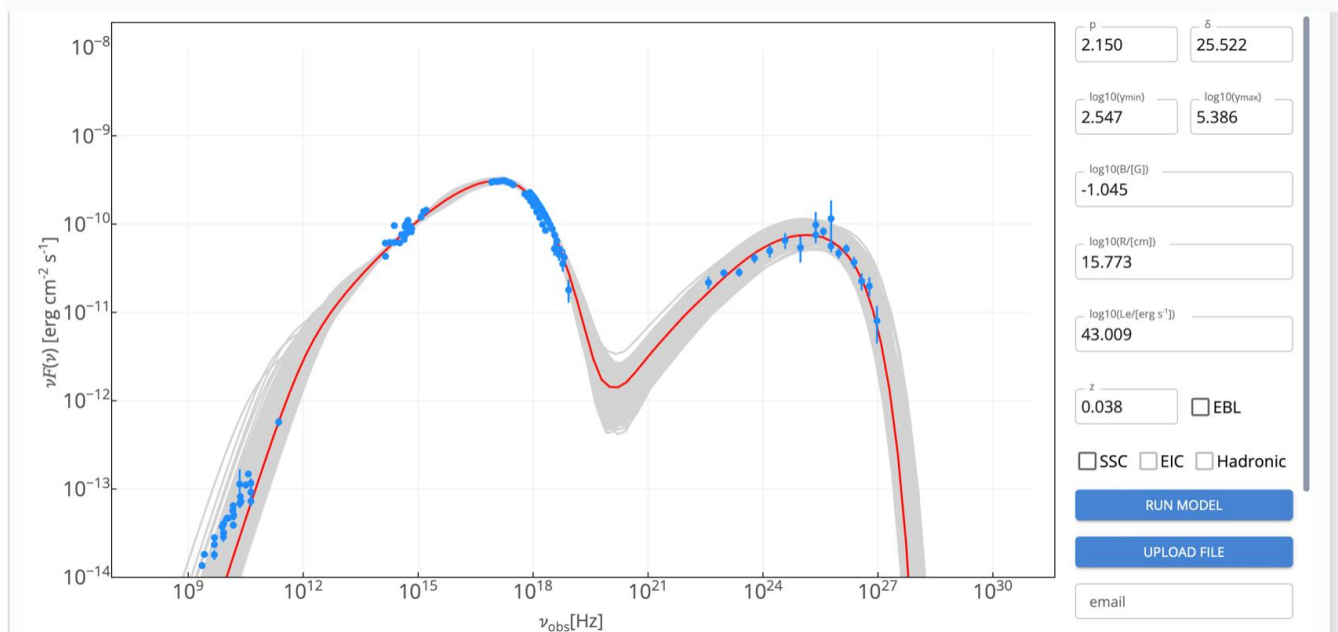
- Originating near supermassive black holes, the relativistic jets of blazars produce intense emissions spanning from radio frequencies to gamma-rays.
- The broadband emission from blazars shows high variability across the electromagnetic spectrum, often manifesting on timescales of days or hours and displaying complex behavior.
- High-energy neutrino detection from blazars confirms hadronic processes within their jets, where protons interact with matter or radiation to create neutrinos. This makes blazars key targets for multi-messenger studies.

In this database, users can search for and construct detailed multi-wavelength SEDs of blazars. SEDs are interactively visualized, allowing data manipulation and time filtering. The SEDs are

constructed by combining archival data from various catalogs (obtained through the VOU-Blazar tool) with time-resolved data across IR, optical, UV, X-ray, and gamma-ray bands.



### Modeling blazar broadband emission with convolutional neural networks



# *Collaboration with other Institutes and Universities*

## *Collaboration with Italy*

*ICRANet:* In collaboration with Prof. Ruffini`s group, the HE emission processes in Crab nebulae, gamma-ray bursts and similar sources (consisting of pulsar and pulsar winds) are studied. In particular, taking into account different injection spectra of electrons and relevant cooling processes (synchrotron, inverse Compton and adiabatic cooling), the emitting electron spectra are obtained from the solution of kinetic equation describing the temporal evolution of electron distribution. With those spectra the electron synchrotron emission is calculated for different time periods and the observed data are modeled.

*ASI science data center with Open Universe Initiative:* In collaboration with Paolo Giommi the light curves of bright blazars are calculated using the adaptive binning method. This method enables the creation of constant-uncertainty light curves with the data of Fermi LAT. This method enables more information to be encapsulated within the light curve than with the fixed-binning method. The results will be published in the web page of open Universe-  
<http://www.openuniverse.asi.it>

## *Collaboration with Germany*



Since 2017 ICRANet group in Armenia joined the MAGIC collaboration with full rights and responsibilities, the group is in close collaboration with the colleagues from the MAGIC

collaboration. This allows obtaining and analyzing high and very high energy gamma- ray data from the observations of different astrophysical objects.





# Recent publications

- Sahakyan N., Harutyunyan G., Israyelyan D., Origin of multiwavelength emission from flaring high redshift blazar PKS 0537-286, Monthly Notices of the Royal Astronomical Society, Volume 521, Issue 1, pp.1013-1022, 2023
- Sahakyan N., Vardanyan V., Khachatryan M., Gradient boosting decision trees classification of blazars of uncertain type in the fourth Fermi-LAT catalogue, Monthly Notices of the Royal Astronomical Society, Volume 519, Issue 2, pp.3000-3010, 2023
- Aimuratov Y., Becerra L., Bianco C., Cherubini C., Della Valle M., Filippi S., Li, Liang, Moradi R., Rastegarnia F., Rueda J., Ruffini R., Sahakyan N., Wang Y., Zhang S., GRB-SN Association within the Binary-driven Hypernova Model, The Astrophysical Journal, Volume 955, Issue 2, id.93, 29 pp., 2023.
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- Harutyunyan G., Multiwavelength Properties of Selected High Redshift Blazars, Astronomy & Astrophysics, Volume 66, Issue 2, p.181-193, 2023
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the Galactic Center with MAGIC, Physical Review Letters, Volume 130, Issue 6, article id.061002, 2023

- MAGIC Collaboration, Abe H., Abe S., Acciari V., ..... Gasparyan S.,.... Sahakyan N.,....., Multimessenger Characterization of Markarian 501 during Historically Low X-Ray and  $\gamma$ -Ray Activity, The Astrophysical Journal Supplement Series, Volume 266, Issue 2, id.37, 43pp., 2023.
- MAGIC Collaboration, Acciari V., Ansoldi S., Antonelli L.,..... Gasparyan S.,.... Sahakyan N.,....., Study of the GeV to TeV morphology of the  $\gamma$  Cygni SNR (G 78.2+2.1) with MAGIC and Fermi-LAT. Evidence for cosmic ray escape, Astronomy & Astrophysics, Volume 670, id. A8, 20pp., 2023.
- MAGIC Collaboration, Acciari V., Aniello T., Ansoldi S.,..... Gasparyan S.,.... Sahakyan N.,....., Long-term multi-wavelength study of 1ES 0647+250, Astronomy & Astrophysics, Volume 670, id. A49, 20pp., 2023.
- MAGIC Collaboration, Acciari V., Agudo I., Aniello T.,..... Gasparyan S.,.... Sahakyan N.,....., A lower bound on intergalactic magnetic fields from time variability of 1ES 0229+200 from MAGIC and Fermi/LAT observations, Astronomy & Astrophysics, Volume 670, id. A145, 8pp., 2023.
- Gasparyan S., Bégué D. & Sahakyan N., Time-dependent lepto-hadronic modeling of the emission processes in blazar jets, The Sixteenth Marcel Grossmann Meeting, World Scientific Publishing, ISBN #9789811269776, pp. 429-444, 2023
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- Harutyunyan G., Israyelyan D., Multiwavelength study of high-redshift blazars, World Scientific Publishing, ISBN #9789811269776, pp. 445-461, 2023
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- Sahakyan, N., Israyelyan, D., Harutyunyan, G., Gasparyan, S., Vardanyan, V., Khachatryan, M. 2022. Modelling the time variable spectralenergy distribution of the blazar CTA 102 from 2008 to 2022. *Monthly Notices of the Royal Astronomical Society* 517, 27572768.
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- Middei R., Giommi P., Perri M., Turriziani S., Sahakyan N., Chang Y., Leto C., Verrecchia F., 2022 The first hard X-ray spectral catalogue of Blazars observed by NuSTAR. *Monthly Notices of the Royal Astronomical Society* 514, 31793190. doi:10.1093/mnras/stac1185
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- Wang, Yu, Rueda J., Ruffini R., Moradi R., Liang L., Aimuratov Y., Rastegarnia F., Eslamzadeh S., Sahakyan N., Zheng Y., 2022 GRB 190829A- A Showcase of Binary Late Evolution, *The Astrophysical Journal* 936. doi:10.3847/1538-4357/ac7da3
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# The Fifth Zeldovich meeting

The Fifth Zeldovich meeting, organized by ICRANet, was held in Yerevan (Armenia) on June 12-17, 2023. This event also commemorated the 80th anniversary of the National Academy of Sciences of the Republic of Armenia whose Members gave equally fundamental contributions to the field of Relativistic Astrophysics.

The topics covered at the meeting will include:

- multimessenger astrophysics;
- early universe, large scale structure, cosmic microwave background;
- neutron stars, black holes, gamma-ray bursts, supernovae, hypernovae; gravitational waves;
- quantum and gravity.



**The Fifth Zeldovich Meeting**  
Yerevan, Armenia, 12 - 17 June 2023  
Website: [www.icranet.org/zeldovich5](http://www.icranet.org/zeldovich5)  
Contacts: [zeld5@icranet.org](mailto:zeld5@icranet.org)

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**TOPICS**

- multimessenger astrophysics;
- early universe, large scale structure, cosmic microwave background;
- neutron stars, black holes, gamma-ray bursts, supernovae, hypernovae;
- gravitational waves;
- quantum and gravity.

The series of Zeldovich meetings started with the celebration of the International Year of Astronomy 2009 in Belarus. These international meetings are organized in honor of Yakov Borisovich Zeldovich, a brilliant Soviet physicist and the father of the Russian scientific school on Relativistic Astrophysics, born in Minsk. The Zeldovich meetings are organized by ICRANet.





The meeting started on Monday morning, June 12 with the opening remarks by Prof. Remo Ruffini (Director of ICRANet), Prof. Narek Sahakyan (Director of ICRANet Armenia) and H.E. Hakob Arshakyan, Vice President of the Armenian National Assembly, at the presence of eminent authorities, such as H. E. Vahe Gevorgyan, Deputy Minister of Foreign affairs of Armenia, H. E. Ashot Saghyan, President of the Armenian National academy of Sciences, H.E. Avet Poghosyan, Deputy Minister of High-Tech Industry of Armenia, H.E. Alfonso Di Riso, Ambassador of Italy in Armenia, as well as Ms. Nilakshi Saha Sinha, Ambassador of India in Armenia.

H.E Arshakyan underlined how Armenia is historically rich in scientific achievements and discoveries, especially in the fields of astrophysics, mathematics and physics. He also emphasized the strong participation of Armenian scientific institutions in similar programs and the leading role played by the Armenian National Academy of Sciences in the field. Deputy Minister Vahe



Gevorgyan highlighted the role of ICRANet as an important platform for international cooperation and noted how the organization of this prestigious international conference is an important step for the development of the field of astrophysics not only in Armenia, but also in all participating countries.



Remo Ruffini, Director of ICRANet (top left), Prof. Narek Sahakyan, Director of ICRANet Armenia (top right), H.E. Hakob Arshakyan, Vice President of the Armenian National Assembly (bottom left) and H. E. Vahe Gevorgyan, Deputy Minister of Foreign affairs of Armenia (bottom right), during the opening ceremony of the 5 th Zeldovich meeting in Yerevan on June 12, 2023.

During the opening ceremony, the Russian scientist Marat Glifanov accepted the MG16 Marcel Grossmann Award on behalf of the Institute of Space Research (IKI) of the Russian Academy of Sciences. The award was presented by ICRANet Director Remo Ruffini for the Spektr-RG/eROSITA satellite. More than 100 participants from 17 different countries joined the conference and presented, in total, 75 talks on the most relevant recent results on multimessenger astrophysics, early universe, large scale structure, cosmic microwave background, neutron stars, black holes, gamma- ray bursts, supernovae, hypernovae,

gravitational waves and quantum and gravity. New results on the leading space projects from space based and ground based astrophysical observatories were also reported, such as: the James Webb Space Telescope JWST (USA), presented by Prof. Massimo Stiavelli and Prof. Garth Illingworth; the radio telescope FAST (China), the X-ray observatory Insight-HXMT (China) as well as the high energy particle observatory LHAASO (China), presented for the first time by Prof. Zha Min, Prof. Li Di and Prof. Shuang-Nan Zhang; the Cherenkov telescopes MAGIC (Germany), the gamma-ray telescope DAMPE (China and Italy), the X-ray polarimeter IXPE (USA and Italy), the X-ray observatory Spektr-RG (Russia and Germany, presented by Prof. Rashid Sunyaev and Prof. Marat Gilfanov of the Russian Academy of Sciences), the network of robotic telescopes MASTER (Russia), the neutrino 8 observatories ICECube (Antarctica) and the Baikal-GVD (Russia) as well as planned missions eXTP (enhanced X-ray Timing and Polarimetry mission) and German-Brazilian-Italian ground-based gamma- ray telescope SWGO.



Prof. Remo Ruffini presenting to Prof. Marat Gilfanov the MG16 Marcel Grossmann Award on behalf of the Russian Academy of Sciences Institute of Space Research.



Prof. Remo Ruffini greeting H.E. Vahagn Khachaturyan, President of the Republic of Armenia, on the occasion of their meeting on June 14, 2023.

On the occasion of the conference, the President of the Republic of Armenia H.E. Vahagn Khachaturyan received on Wednesday, June 14 a delegation of participants and organizers of the 5 th Zeldovich meeting. This delegation was composed of Prof. Remo Ruffini, Prof. Narek Sahakyan, Academician Ashot Saghyan (President of the NAS RA), Prof. Shuang-Nan Zhang (Center for Particle Astrophysics, Institute of High Energy Physics, CAS), Prof. Di Li (National Astronomical Observatories, Chinese Academy of Sciences), Prof. Tsvi Piran (the Hebrew University of Jerusalem), Prof. Paolo Soffitta (INAF IAPS) and Prof. Alexei Starobinsky (Landau Institute for Theoretical Physics RAS). President Khachaturyan highly valued the organization

of such events and expressed his willingness to support programs and initiatives in the field of science to the best of his ability, stressing the importance of ICRA Net activities in Armenia. Prof. Ruffini welcomed cooperation with Armenia and noted that there is an intention to implement new programs with the countries of Central Asia via Armenia. All the interlocutors discussed possibilities of the implementation of joint programs and further deepening of cooperation with the world's leading centers, organizations, and universities, such as ICRA Net.



H.E. Vahagn Khachaturyan, President of the Republic of Armenia, meeting the 5 th Zeldovich meeting delegation, together with representatives from the Italian Embassy in Yerevan on June 14, 2023. Group photo of the 5 th Zeldovich meeting delegation with the President of Armenia. From the left to the right: Prof. Alexei Starobinsky, Prof. Narek Sahakyan, Prof. Shuang-Nan Zhang, Prof. Remo Ruffini, H.E. Vahagn Khachaturyan, Prof. Di Li, Prof. Tsvi Piran, Prof. Paolo Soffitta, Prof. Vahram Dumanyan (Adviser to the President Khachaturyan ) and Academician Ashot Saghyan.



## Visit of H.E. Alfonso Di Riso, Ambassador of Italy in Armenia, to the ICRANet Armenia Seat, November 30, 2021



H.E. Alfonso Di Riso, Ambassador of Italy in Armenia with Prof. Narek Sahakyan, Director of ICRANet Seat in Armenia, visiting the center on Tuesday November 30, 2021

On November 30, 2021, the Ambassador Extraordinary and Plenipotentiary of Italy to Armenia, H.E. Alfonso Di Riso and the Head of the Consular and Administrative Department, Dr Annarosa Colangelo, visited the ICRANet Armenia Seat, located at the National Academy of Sciences of the Republic of Armenia.

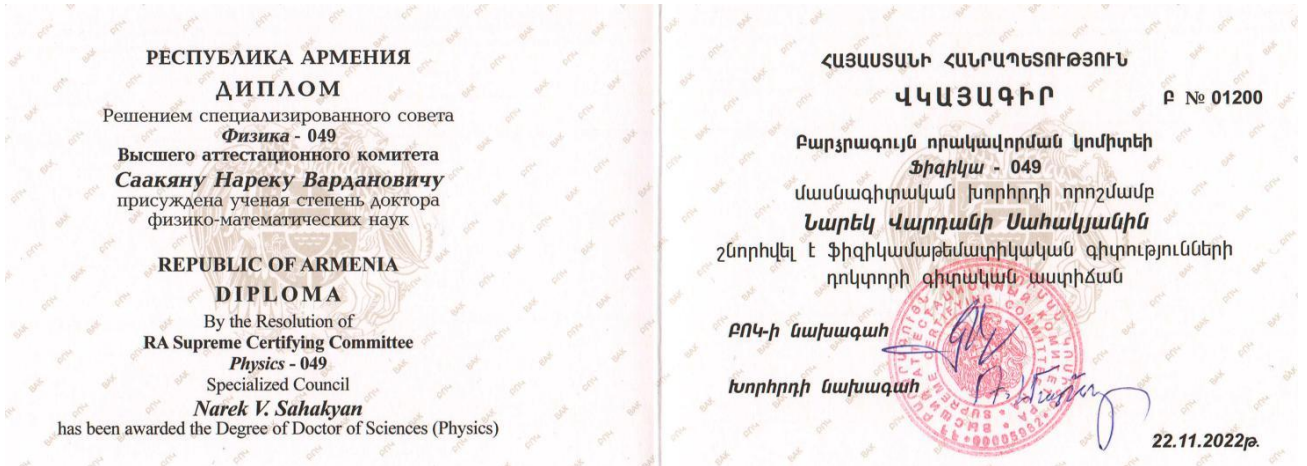
Prof. Narek Sahakyan, Director of the ICRANet Seat in Armenia, presented the center and its current activities as well as the main research topics and the obtained results. Also, the current projects implemented with the ICRANet center in Pescara have been presented and discussed. The importance of the ICRANet Armenia center to expand the activities of ICRANet in the regional countries was highlighted and discussed.

Both parties strongly highlighted the importance of the Armenian-Italian scientific cooperation in the field of astrophysics and discussed the possibilities of further develop and expand the Armenian-Italian scientific cooperation.

Press Release by the National Academy of Sciences of Armenia (in Armenian):

<https://www.sci.am/newsview.php?id=454&arch=&langid=2>

# Director of ICRANet-Armenia and ICRANet Faculty Professor Narek Sahakyan awarded the Doctor of Sciences (DSc) degree in physics



On November 22, 2022, the Director of ICRANet-Armenia Narek Sahakyan has been awarded the Doctor of Sciences (D Sc) degree in physics, as announced by the Higher Attestation Commission (VAK) of Armenia (<https://www.bok.am/en/node/14246>). His dissertation "Study of multiwavelength and neutrino emission from blazars" has been successfully defended on the June 25, 2022.

Professor Sahakyan has so become one of the few young Armenian researchers, awarded of this highest scientific degree in his country under the age of 40.

On December 22, 2022 ICRANet Armenia PhD student David Israyelyan successfully defended his PhD thesis "Investigation of UV and X-ray properties of blazars"





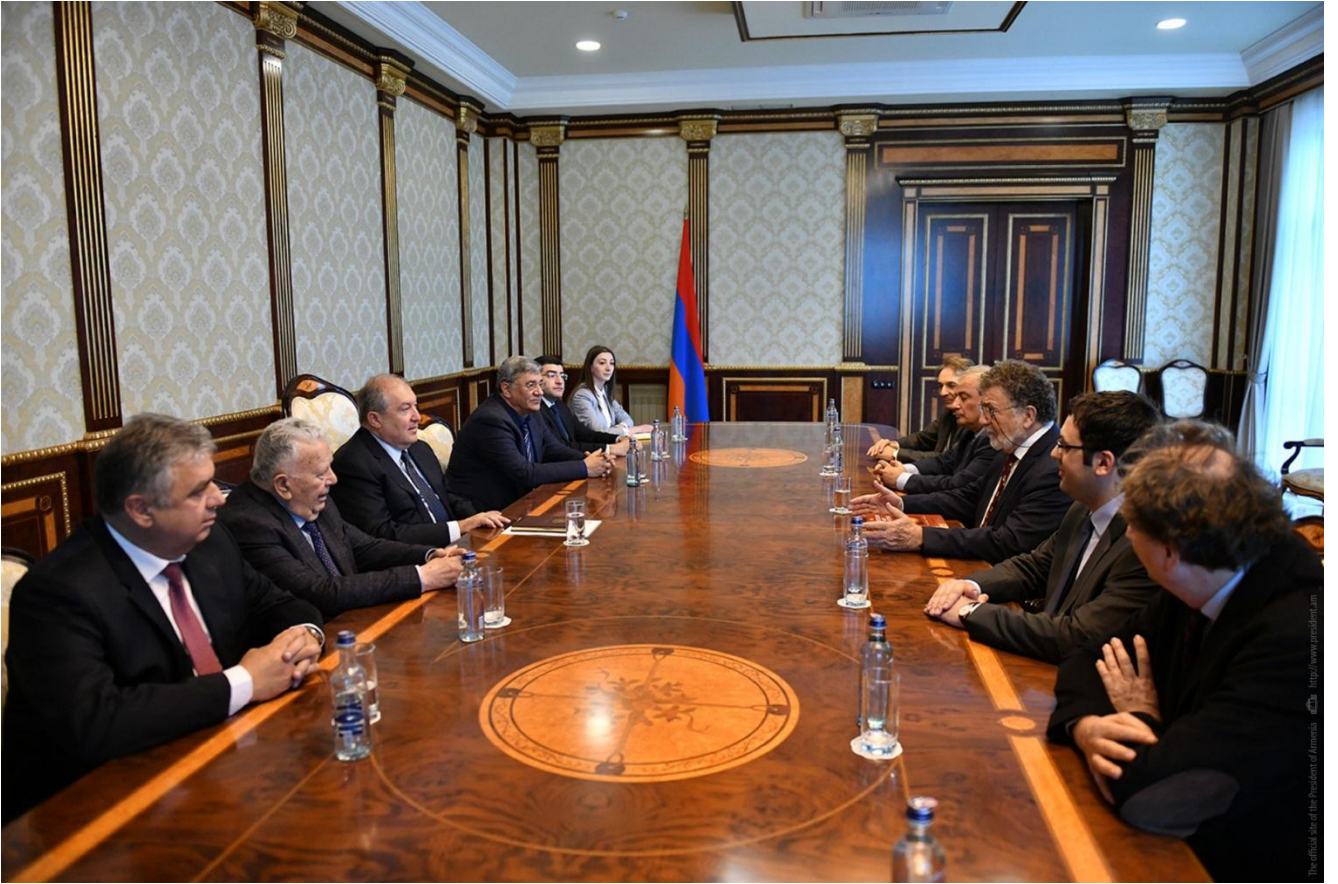
On June 06, 2023 ICRANet Armenia PhD student Gevorg Harutyunyan successfully defended his PhD thesis "Investigation of UV and X-ray properties of blazars "



# Meeting with the President of Republic of Armenia







## *Meeting with the Foreign Minister of the Republic of Armenia*

On June 10, the Minister of Foreign affairs of the Republic of Armenia Edward Nalbandian hosted Prof. Remo Ruffini, the Director of International Centre for Relativistic Astrophysics (ICRA) Network and the delegation headed by him. The President of the National Academy of Sciences of Armenia, Academician Radik Martirosyan and Ambassadors of the Network's founding countries Italy and Brazil, H.E. Mr. Giovanni Ricciulli and H.E. Edson Marinho Duarte Monteiro also attended the meeting. Welcoming the guests, Minister Nalbandian mentioned, that the membership to the ICRANet proves the importance which Armenia gives to the development of Astrophysics. Expressing gratitude for the reception, Professor Ruffini emphasized that, the geographic location of Armenia and achievements in astrophysics allows to play an important role in the development of Astrophysics in the neighboring countries. During the meeting, the recent activities of ICRANet were discussed.







## *Meeting with the President of the National Assembly of Armenia*



On July 3, 2014 the President of National assembly of the Republic of Armenia Galust Sahakyan met with Prof. Remo Ruffini, Director of the International Centre for Relativistic Astrophysics (ICRA) Network, Massimo Della Valle, Director of Naples Astronomical Observatory, and Narek Sahakyan, Head of ICRANet Armenia, who were participating in the first international meeting of the Relativistic Astrophysics International Centre Network in Yerevan from June 30 to July 4. Welcoming the guests, the NA President highlighted the role of science in the development of our country, considering Armenia's membership to the ICRA Network jointly with Italy, Brazil and Vatican an honour. Emphasizing the conduct of the conference in Yerevan, Galust Sahakyan has noted that the current level of research and studies in the field of Astrophysics in Armenia are based on deep scientific traditions and potential. He highly assessed the role of the ICRA Network Regional Center, which can be of major importance.

Expressing gratitude for the reception, Prof. Remo Ruffini highly appreciated Armenia's membership to the ICRANet and underlined the importance of such meetings, during which numerous discoveries are made and noted several big scientific discoveries had been made during the conference.

# Meetings in Armenia

## **Armenian-Italian Science Day** **"Joint ICRANet activities in Relativistic Astrophysics"**

*Information Event for Cooperation in the field of Relativistic Astrophysics  
between Armenia and ICRANet*

**Monday April 15, 2019**  
**Yerevan, Armenia**

**Program** | **Photos and Videos** | **Press releases**

### **Venues:**

*Morning session  
from 10:00 AM*

**RA National Academy of Sciences**  
24, Marshall Baghramian Ave.  
0019 Yerevan



*Afternoon session  
from 03:00 PM*

**Italian Embassy in Yerevan**  
5 Italia Street  
0010 Yerevan









NASRA



ICRANet

**Armenian-Italian Science Day  
“Joint ICRANet activities in Relativistic Astrophysics”**

Information Event for Cooperation in the field of Relativistic Astrophysics  
between Armenia and ICRANet

**Monday, April 15, 2019, Yerevan**

The working languages of the event are Armenian and English

Venue: RA National Academy of Sciences

24, Marshall Baghramian Ave. 0019 Yerevan

10:00 ***Opening and welcome addresses***

*Moderator: Amb. Ashot Kocharian*

10:00 Artak Apitonian, Deputy Minister of Foreign Affairs RA

10:05 Radik Martirosyan, President of the RA National Academy of Sciences (host institution)

10:10 Samvel Haroutiunian, Chairman of the RA MES Science Committee

10:15 Vardan Sahakyan, Deputy Chairman of the RA MES Science Committee

10:20 Vincenzo Del Monaco, Ambassador of Italy to Armenia

10:25 Agemar de Mendonça Sanctos, Ambassador of Brazil to Armenia

10:30 Matthias Kiesler, Ambassador of Germany to Armenia

10:35 Remo Ruffini, Director of ICRANet



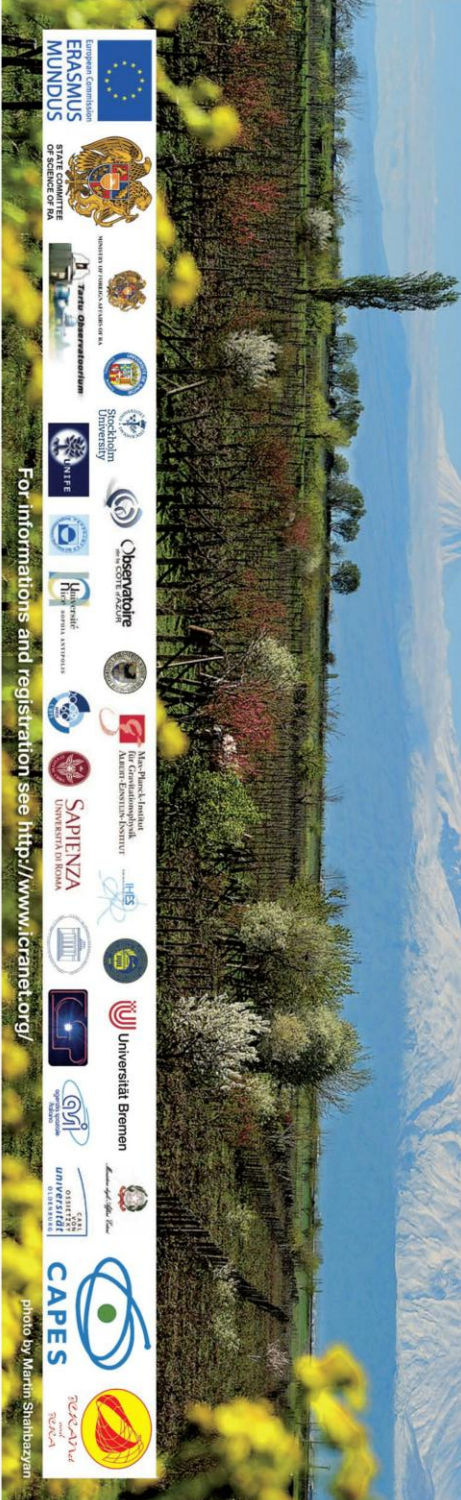
# 1<sup>st</sup> Scientific ICRANet Meeting in Armenia: Black Holes; the largest energy sources in the Universe June 30 - July 4, 2014 – Yerevan (Armenia)

The Physics of Black Holes dominates some of the most energetic astrophysical phenomena in the Universe. The formation of a Black Hole appears to be related to the emission of a Gamma Ray Burst (GRB), the most energetic transient phenomena in the Universe. The basic mechanism appears to be the creation of electron positron pair plasma occurring by vacuum polarization process around a Kerr-Newman Black Hole by the Haisenberg-Euler-Schwinger mechanism. An effort for reaching such an extreme electromagnetic quantum regime is being currently approached also in Megajoule Laser Projects in Europe, Russia, USA. In addition a prolonged emission appears to be related to rotating electromagnetic Black Holes in microquasars. The presence of Supermassive Black Holes (SMBHs) of  $10^6 - 10^9$  solar masses appears to be related to active galactic nuclei, Blazars and Quasars. There is the possibility that, unlike the stellar mass Black Holes, which are formed by the gravitational collapse of baryonic matter, the SMBHs can originate from the gravitational collapse of Dark Matter. This meeting will address both observational/experimental and theoretical aspects. From an observational point of view, results obtained from very high energy observatories from the ground such as HESS, MAGIC, AUGER and from next generation instruments will be reviewed. Similarly will be reviewed the observations from Space Observatories in X and Gamma Rays such as Agile, Fermi, Swift, MAXI and NuStar. The complementary observations in Microwave and infrared bands from Planck mission will be presented. Ongoing progress for experimental facilities to look for coincidence with Gravitational waves detectors and Neutrinos detectors will be also reviewed. From a theoretical point of view attention will be given to progress in understanding quantum and classical phenomena related to the physics of Black Holes and to the process of extraction of the Black Hole Energy.

From June 23 to June 27 a graduate school, on the same topics of the meeting, will take place in the mountains close to Yerevan. In addition to the IRAP-PhD students, other graduate students are welcome.

**INTERNATIONAL ORGANIZING COMMITTEE:** **ARMENIA:** Anahronian Felix (co-chair), Avagyan Roland, Chubulyan Edward, Fedotkin Vladimir (co-chair), Merdanyan Ruzik (co-chair), Mirzoyan Razmik, Papoyan Aram, **AZEBAIJAN:** Wafiqi Faruk, Romoza Gustavo, **INDIA:** Bharti Debi, **CHINA:** Gao Jun, Peng **INDONESIA:** Eshkolof M, **FRANCE:** Garbino, **GERMANY:** G.P. Singh, Gopfert Zoltan, **ITALY:** Caporaso, **NETHERLANDS:** de Graaf, **NETHERLANDS:** van der Plas, **NETHERLANDS:** D.P. van den Broek, **HUNGARY:** Karon, **KOREA:** Chonhyoung H., **KOREA:** Hyeon, **KOREA:** Keungho, **KOREA:** Jinho, **LITHUANIA:** Gerasim, **LITHUANIA:** D.P. van den Broek, **INDIA:** Chakrabarti Sanku K., **ISRAEL:** Piran Tali, **ITALY:** Belloni Michael, **KAZAKHSTAN:** Lamerzaidi Claus, **MEXICO:** Hernandez Perick, **NETHERLANDS:** Padu, **BULGARIA:** Fleno (chair), **JAPAN:** Muroz, **VENESUELA:** Gregorio, **VISCONSIN:** Xue Shengcong, **NEW ZEALAND:** Kerr Boy, **RUSSIA:** Benvenisty-Kogan Gennady, **BYELORUSSIA:** Bykov Andrei, **CHECHENIA:** Valery, **KIRGIZSTAN:** Dmitry, **SHANGHAI:** Shuyuan Rusind, **TURKEY:** Lez, **SOUTH KOREA:** Kim Sung Pyo, **KOREA:** Sang Woon, **LEBANON:** Lee Hyun Kyu, **LEBANON:** Woon Park, **MYANMAR:** Gu, **SWEDEN:** Byde Felix, **RUSSIA:** Kostoi Kell, **USA:** Arnett David, **FRANCE:** Evrard Francis, **JAPAN:** Robert, **MEXICO:** Grant, **MEXICO:** Janny, **NETHERLANDS:** Robert, **VATICAN STATE:** Frans, **FRANCE:** Jose Gabriel, **NETHERLANDS:** Sioni Gabrielle.

**LOCAL ORGANIZING COMMITTEE:**  
Baghdasaryan Daniel, Ghazaryan Selenik,  
Harutyunyan Arus, Harutyunyan Galina,  
Harutyunyan Henrik, Harutyunyan Hrantik,  
Shinyan Norik (co-chair),  
Shinyan Aram.



For informations and registration see <http://www.icranet.org/>

photo by Martin Shakhbazyan



# *1st Scientific ICRANet Meeting in Armenia: Black Holes: the largest energy sources in the Universe*

In 2014 an international conference in Yerevan was organized in Yerevan with the participation of more than 80 scientists from Italy, Germany, France, Brazil, Korea, Iran and Armenia. The conference opening ceremony was attended by the President of NAS RA, academician R. Martirosyan, Academician-Secretary of the Division of Physics and Astrophysics of NAS RA Y. Chilingaryan, Deputy Minister of Foreign Affairs of RA G. Nazarian, the Ambassador of Italy to the Republic of Armenia G. Ricciulli, the Ambassador of the Federative Republic of Brazil to the Republic of Armenia E. M. D. Monteiro, the Ambassador of Vatican to RA Monsignor Marek Sozinski.







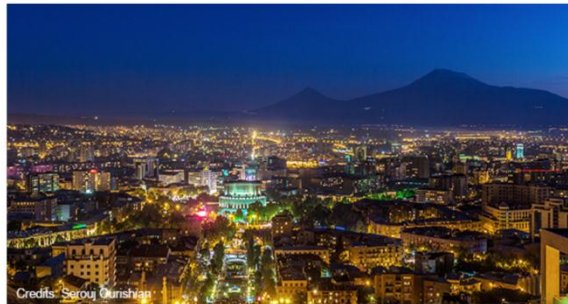
# MAGIC collaboration meeting in Yerevan

## MAGIC Collaboration Meeting Yerevan 2019

23-28 June 2019  
Ramada Hotel  
Asia/Yerevan timezone

See the group photos in 'Material'

Overview
Timetable
Contribution List
Registration
Participant List
Accommodation
Travel
Social Events
Conference Fee
Tour Options (before/after the meeting)
Local Information



The MAGIC collaboration meeting was held in Yerevan from 23 to 28 June 2019 with 60 participants from different countries.





An official reception was held on June 27 in Yerevan, during the MAGIC collaboration meeting. In this occasion, both MAGIC and LST1 scientific highlights and high-tech solutions were presented to the Minister of Education, Science, Culture and Sport Arayik Harutyunyan and to Radik Martirosyan, President of the National Academy of Sciences of Armenia





## Visit to Iran





