

Enclosure 4

ICRANET ARMENIA SEAT

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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.



Prof. Ruffini with PhD students.

Current members of the group



Dr. Narek Sahakyan

Period 2014-



Davit Zargaryan

PhD student 2015-2018



Vardan Baghmanyany

PhD student 2015-2018



Sargis Gasparyan

PhD student 2016-2019



Meri Tumanyan

Master student 2016-2018



Tatevik Mkrtchyan

undergrounded student 2016-

Administration



Susanna Kostandyan

Secretary 2014



Gurgen Petrosyan

system administrator
2014-

Scientific activity of ICRANet in Armenia

The main scientific activities of ICRANet-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. Currently ongoing research projects in ICRANet Armenia are:

- Study the emission processes of misaligned active galactic nuclei (radio galaxies and narrow line Seyfert 1) using X-ray (Swift/NuStar) and gamma-ray (Fermi LAT) data.
- Study of the origin of the emission in the large scale jets of active galactic nuclei. The combination of Fermi LAT and Chandra data allows to investigate the properties of the jets from sub-parsec to kpc scales.
- Investigation of emission processes in the jets of blazars. Taking into account the results from the observations of BL Lac and FSRQs blazars from radio to very high energy gamma-ray bands, the underlying particle distributions are obtained using Markov Chain Monte Carlo technique which allows to investigate the acceleration processes.
- The production of very high energy neutrinos in the jet of microquasars and blazars are investigated. Also the possibility of detection of those neutrinos with current (IceCube) and future instruments (KM3Net) is discussed.
- Using time dependent electron spectra, the emission processes in Crab nebulae and similar sources (consisting of pulsar and pulsar winds) are studied during the first years of their formation.

Collaboration with other Institutes and Universities

Collaboration with Italy

ICRANet: In collaboration with Prof. Ruffini's group, the emission processes in Crab nebulae 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: 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 ASI science data center.

Collaboration with Brazil

In collaboration with Barres de Almeida, Ulisses, Bernardo Machado de Oliveira Fraga and etc from Brazil the emission from Markarian 421 is investigated using optical, X-ray and gamma-ray data. Also the polarization of the emission and changes in the polarization degree is investigated.

Collaboration with Germany

The group is in close collaboration with Felix Aharonian and his group in Max-Planck-Institut für Kernphysik (Heidelberg, Germany). During his visit to Armenia, prof. Aharonian frequently meets with the students and discusses the recent results and progresses. Also, it is expected that this year PhD students will visit Heidelberg for joint scientific collaborations.



MAGIC Telescope

According to the discussions with Razmik Mirzoyan (Max-Planck-institute for physics, Munich Germany), the PI of MAGIC collaboration, it is expected that the ICRANet group in Yerevan will join MAGIC collaboration and, possibly, also Cherenkov Telescope Area (CTA).

Recent publications

- N. Sahakyan, V. Baghmanyany, D. Zargaryan, Gamma-ray emission from non-blazar AGNs, AIP Conference Proceedings 1792, 050002, 2017 <http://doi.org/10.1063/1.4968948>.
- N. Sahakyan, S. Gasparyan, High energy gamma-rays from PKS 1441+25, AIP Conference Proceedings 1792, 050005, 2017, <http://doi.org/10.1063/1.4968951>.
- D. Zargaryan, The gamma-ray emission from broad-line radio galaxy 3C 120, AIP Conference Proceedings 1792, 050008, 2017, <http://doi.org/10.1063/1.4968954>.
- V. Baghmanyany, Gamma-ray variability of NGC 1275, AIP Conference Proceedings 1792, 050007, 2017, <http://doi.org/10.1063/1.4968953>.
- N. Sahakyan, Galactic sources of high energy neutrinos: Expectation from gamma-ray data, EPJ Web of Conferences, Volume 121, id.05005, 2016.
- N. Sahakyan, D. Zargaryan and V. Baghmanyany, On the gamma-ray emission from 3C 120, Astronomy & Astrophysics, Volume 574, id.A88, 5 pp., 2015.
- N. Sahakyan, R. Yang, F. Rieger, F. Aharonian, E. de Ona-Wilhelmi, High Energy Gamma Rays from Centaurus A, Proceedings of the MG13 Meeting on General

Relativity, World Scientific Publishing, 2015. ISBN #9789814623995, pp. 1028-1030.

- N. Sahakyan, F. Rieger, F. Aharonian, R. Yang, E. de Ona-Wilhelmi, On the Gamma-Ray Emission from the Core and Radio Lobes of the Radio Galaxy Centaurus a, International Journal of Modern Physics: Conference Series, Volume 28, id. 1460182, 2014.
- N. Sahakyan, G. Piano, M. Tavani, Hadronic Gamma-Ray and Neutrino Emission from Cygnus X-3, The Astrophysical Journal, Volume 780, Issue 1, article id. 29, 7 pp., 2014.
- N. Sahakyan, R. Yang, F. Aharonian, F. Rieger, Evidence for a Second Component in the High-energy Core Emission from Centaurus A?, The Astrophysical Journal Letters, Volume 770, Issue 1, article id. L6, 5 pp., 2013.
- R. Yang, N. Sahakyan, E. de Ona Wilhelmi, F. Aharonian, F. Rieger, Deep observation of the giant radio lobes of Centaurus A with the Fermi Large Area Telescope, Astronomy & Astrophysics, Volume 542, id.A19, 8 pp., 2012.

The entrance of Armenia in ICRANet

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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

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

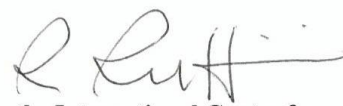
The Parties may, by mutual consent, introduce amendments and supplements to this Agreement by separate records. The latter shall come into force in conformity with the procedure set forth by the present Agreement and shall be considered as part of the it.

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**

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.

of the Federative Republic of Brazil to the Republic of Armenia E. M. D. Monteiro, the Ambassador of Vatican to RA Monsignor Marek Sozinski.





Visit to Iran

