Enclosure 5

Status of the request of adhesion of Belarus

ICRANet activities

in Belarus

2008 - 2019

CONTENTS

Национальная академия наук Беларуси

The National Academy of Sciences of Belarus presents its compliments to the International Center for Relativistic Astrophysics Network (ICRANet).

Aware of the importance of research in relativistic astrophysics for the understanding of the structure and evolution of our universe as well as for the identification of the fundamental laws of nature;

Aware that research in this area must be based on international cooperation as a necessity;

Aware of the Law of the Republic of Belarus "On International Treaties of the Republic of Belarus" from July 23, 2008 No 421-Z;

Aware of the Agreement of the Establishment and Statute of ICRANet;

Recognizing a strong interest of ICRANet in establishing long term cooperation with the Republic of Belarus at the highest level in research and training in relativistic astrophysics and related areas;

Recognizing the leading role of ICRANet in international cooperation of research and training in this area;

The National Academy of Sciences of Belarus acting in accordance with Article 4 of the Law of the Republic of Belarus "On International Treaties of the Republic of Belarus" and in accordance with Article II of the Agreement of Establishment and Statute of ICRANet expresses its interest in accession of the Republic of Belarus to ICRANet as a Member State of ICRANet.

Recalling that the Cooperation Agreement between the National Academy of Sciences and ICRANet is in force from 2013, it allowed organizing several international meetings in Minsk, Belarus, including two Zeldovich meetings.

Recalling that in 2017 the ICRANet-Minsk Center has been established in the National Academy of Sciences. The accession of the Republic of Belarus to ICRANet as a Member State will allow this center to become the official seat of ICRANet in Belarus, which will become a regional seat for collaboration with scientists from nearby countries: Estonia, Latvia, Lithuania, Poland, Russia, Ukraine and Sweden. It will also allow

РУП «Издательство «БДП». Т. 12 000. Зак. 1077. 2011 г.

establishing the regional data center for data from cosmic, ground and underground observatories operating within the European network GEANT.

The National Academy of Sciences also expresses its interest in full participation in the International Relativistic Astrophysics Ph.D. program – IRAP PhD coordinated by ICRANet.

Yours sincerely,

Acad. Vladimir Gusakov
Chairman of Presidium
National Academy of Sciences
of Belarus

Governing Board
of the International Center for
Relativistic Astrophysics
Network (ICRANet)

Discussion on accession of the Republic of Belarus to ICRANet

In March 2014 prof. Remo Ruffini had a meeting with the First Deputy Minister of Foreign Affairs, Mr Aleksandr Mikhnevich. They discussed successful joint activities, including two international conferences organized by ICRANet in Belarus, as well as organization of ICRANet center in Belarus, and possible entrance of Belarus to ICRANet.

Fig. 9. Meeting of Director of ICRANet, prof. Remo Ruffini and the Chairman of the Standing Committee for Foreign Affairs and National Security prof. Sergei Rakhmanov, 27 April 2017.

In August 2015 Dr. Gregory Vereshchagin had a meeting with the chairman of the State Committee on Science and Technology of the Republic of Belarus, Dr. Alexander Shumilin and discussed with him, on behalf of Director of ICRANet, organization of ICRANet center in Belarus and possible accession of Belarus to ICRANet.

In April 2017 prof. Remo Ruffini had a meeting with the Chairman of the Standing Committee for Foreign Affairs and National Security prof. Sergei Rakhmanov and discussed possible accession of Belarus to ICRANet. In April 2018, during the Third Zeldovich meeting the delegation from ICRANet has been received by the Deputy Minister of Foreign Affairs of Belarus and discussion about the accession of Belarus to ICRANet took place.

Following these meetings the National Academy of Sciences has initiated the request to the Council of Ministers of the Republic of Belarus to start the procedure towards the accession of the Republic of Belarus to ICRANet.

The official copy of the Agreement of Establishment of ICRANet and Statute were received by the Ministry of Foreign Affairs of Belarus in June 2019. The diplomatic note was sent to the Government of Italy requesting several clarifications in August 2019.

AGREEMENT BETWEEN THE INTERNATIONAL CENTER FOR RELATIVISTIC

ASTROPHYSICS NETWORK (ICRANET) AND THE GOVERNMENT OF THE REPUBLIC OF BELARUS ON THE ESTABLISHMENT OF A ICRANET

HEADQUARTERS IN BELARUS

The International Center for Relativistic Astrophysics Network (ICRANet),

and

The Government of the Republic of Belarus (hereinafter referred to as

"Government")

(both hereinafter referred to as "Parties")

Desiring to strengthen cooperation between ICRANet and Belarus in the promotion, in Belarus, of training, education and research in the field of Relativistic Astrophysics; and

Recognizing that a dedicated ICRANet headquarters in Belarus shall also bring about ICRANet's commitment to enhance knowledge in the domain of Cosmology, Theoretical Physics and Mathematical Physics among Belarusian research and development (R&D) institutions,

Hereby agree as follows:

Article I

The Parties establish the following definitions for the purposes of the interpretation of this Agreement:

a) "Government", means the Government of the Republic of Belarus;

b) "ICRANet" means the International Center for Relativistic Astrophysics Network;

c) "competent authorities", the authorities of the Republic of Belarus, in accordance with its laws;

d) "headquarters", the premises and annexes, whatever their owner, occupied by ICRANet;

e) "property", the real estate, furniture, vehicles, rights, assets in any currency, credits, income, other assets and everything that may constitute the patrimony of ICRANet;

f) "files", the correspondence, manuscripts, audio-visual material of any kind, as well as all other documents belonging to ICRANet or in its possession;

g) "Head of Mission", the head of the permanent regional headquarters of ICRANet in Belarus;

h) "staff, ICRANet's headquarters officers or hired employees who are not Belarusian nationals or do not have permanent residence in the Republic of Belarus;

i) "dependents", every family member who depends economically or is under the legal responsibility of the persons mentioned in subparagraphs g) and h) of this Article, and

j) "local personnel", the employees hired by ICRANet in the territory of Belarus for the performance of administrative duties or services.

Article II

1. ICRANet shall establish a headquarters in Belarus.

2. The ICRANet's headquarters in Belarus shall be responsible for developing, coordinating and actively supporting the overall cooperation among ICRANet and the Government, the academic community, and the civil society to promote development of frontier sciences in the field of Relativistic Astrophysics. Cooperation shall include the development of country studies and research programmes with the participation of Belarusian scientific and technological institutions, the provision by ICRANet of high quality services and the mobilization of resources for the financing of projects.

3. The ICRANet headquarters in Belarus shall have a Head of Mission which, in the performance of his/her duties, shall:

a) Act as accredited representative of ICRANet in Belarus as well as ICRANet representative for important international or regional organizations located in the country;

b) Promote ICRANet's services in Belarus;

c) Develop a strategic framework of cooperation, an annual work programme, active partnerships between ICRANet and Belarus and fruitful relationships and communication with the Government, academic community, civil society, non-governmental organizations, all other multilateral and bilateral organizations;

d) Lead and coordinate the overall programmes and projects development and mobilize related financial resources in Belarus;

e) Support and monitor the implementation of ICRANet projects and programmes, and contribute to the management of all other ICRANet activities in Belarus;

f) Manage the ICRANet's headquarters in Belarus and its resources, and ensure its sustainability;

Article III

This Agreement does not imply any financial obligation to the Belarusian Government regarding the costs deriving from the establishment and functioning of the ICRANet Headquarters in Belarus. Any financial commitment in this regard shall be subject to future Agreements between the Parties.

Article IV

ICRANet possesses legal personality and in order to achieve its purposes is entitled to:

a) hire and contract;

b) acquire goods and real estate, maintain financial resources and freely dispose of said resources;

c) initiate legal or administrative procedures in its own interest;

d) possess funds in foreign currency of any kind and keep their accounting in any denomination, in conformity to the Belarusian legislation, and

e) transfer its funds in foreign currency within the country or abroad, in conformity to the Belarusian legislation.

Article V

The headquarters shall remain under the authority and responsibility of ICRANet. Nevertheless, Belarusian sanitary and other pertinent legal requirements, specially labor related ones, shall apply.

Article VI

The Government shall not be responsible for acts or nonfeasance by ICRANet or by any of the staff members.

Article VII

The headquarters and its files shall be inviolable. Competent local authorities may only enter the headquarters in the performance of their duties with the consent of the Head of Mission. In case of fire or any other accident involving a hazard to public safety, the consent of the Head of Mission shall be tacit. The Government shall take appropriate measures to protect the headquarters against any trespasser or harm.

Article VIII

The headquarters shall not be used for any end not compatible with the purposes and functions of ICRANet. ICRANet shall not allow the headquarters to serve as a haven for fugitives or convicted persons under Belarusian law, or for persons whose extradition may have been requested by another country, or who try to elude judicial proceedings.

Article IX

ICRANet and its properties shall enjoy immunity of jurisdiction and of execution in the territory of the Republic of Belarus, except:

a) in the case of express renunciation, through its Head of Mission;

b) in the case of a labor or social security related suit initiated by an employee or a former employee of the Mission;

c) in the case of a civil suit initiated by a third party for damages, injury or death resulting from accident caused by a vehicle or aircraft belonging to or used on behalf of ICRANet;

d) in the case of a traffic violation involving a vehicle belonging to ICRANet or used on its behalf, and

e) in the case of a countersuit directly related to a court suit initiated by ICRANet.

Article X

In hiring local employees, ICRANet shall be subject to the laws on labor relations and social security of the Republic of Belarus.

Article XI

Properties belonging to ICRANet in the territory of the Republic of Belarus for the purpose of installing and maintaining the headquarters of the Mission, regardless of their location or of whoever holds them, shall be exempt from:

a) any form of requisition, confiscation or sequestration;

b) expropriation, except in the case of public use defined by law and with prior compensation, and

c) any form of restriction or administrative, judicial or legislative interference, except when temporarily necessary for the prevention or investigation of accidents.

Article XII

ICRANet must contract, in the Republic of Belarus, insurance to cover civil liability for damages caused to third parties.

Article XIII

1. ICRANet, the Head of Mission and its staff shall be exempt from state and municipal taxes on the premises and its annexes, of which they are the owners, except when such taxes cover compensation for public services.

2. The above mentioned fiscal exemption shall not apply to taxes and other dues which, according to Belarusian law, fall under the responsibility of persons hired by ICRANet or by its Head of Mission.

3. Fiscal exemptions, privileges and immunities conferred to ICRANet by means of the present Agreement shall not be extended to Belarusian citizens or permanent residents in Belarus.

Article XIV

ICRANet shall be exempt of any kind of customs duties, taxes and other dues regarding the import and export of articles, publications or goods designed for the official use of ICRANet which shall be not traded in the Republic of Belarus without the authorization of the Government.

Article XV

The Head of Mission and staff members, in addition to the provision of article XIII, paragraph 3 above, shall be exempt from the payment of taxes, except:

a) indirect taxes, normally included in the price of goods and services;

b) taxes and other dues on private real estate located in the Republic of Belarus, unless owned by ICRANet and used as official premises.

c) taxes and other dues on private income, including capital gains originating in the Republic of Belarus, and taxes on income relating to investments in commercial or financial companies in the Republic of Belarus;

d) taxes and other dues relating to compensation for public services;

e) taxes on successions or transmissions demandable by the Republic of Belarus, and

f) dues for registration, court costs, mortgage and stamp, except as provided for in

Article XIV.

Article XVI

1. The staff members who are not Belarusian citizens or who do not have permanent residence in the Republic of Belarus, and who need to remain in the country in the exercise of their duties for a period of not less than one (1) year and have been accredited by the Government pursuant to Article XXIX, may import, within six (6) months of their arrival, or export free of custom duties, taxes and other dues, their belongings and personal effects, which cannot be traded in the country without authorization from the Government.

2. The Head of Mission and the staff members shall not be exempt from dues relating to storage, transport and other charges for related port services.

Article XVII

Staff members, except Belarusian citizens and persons having permanent residence in Belarus, shall enjoy exemption for the import of articles of personal consumption according to the regulations in force in the Republic of Belarus. Such exemption shall be granted pursuant to the rules established by the competent authorities.

Article XVIII

Staff members who are not Belarusian citizens or who do not have permanent residence in Belarus shall enjoy the same facilities and exemptions in monetary or foreign currency exchange matters granted to headquarters of similar functions in other international organizations who are on mission in the Republic of Belarus.

Article XIX

1. The Head of Mission and staff members shall enjoy immunity of jurisdiction relating to acts, including in speech and writing, performed by themselves in the exercise of their official functions and within the limits of their duties, even after the conclusion of the period of their mission, except:

a) in the case of a civil suit initiated by third parties for damages originating in an accident caused by a vehicle or aircraft belonging to them or driven by them, or relating to a traffic violation involving such a vehicle and committed by them;

b) in the case of a suit relating to private real estate located in the Republic of Belarus, unless such real estate is under the possession of ICRANet and serves to fulfill its purposes;

c) in the case of a succession suit in which the Head of Mission or a staff member appears as a private individual and not on behalf of ICRANet as the executor, administrator, heir or legatee of a testament; and

d) in the case of an action relative to any commercial or professional activity exercised before taking headquarters.

2. The Head of Mission and staff members cannot be the object of any executory measure, except in the cases mentioned in subparagraphs a), b), c) and d) of this Article, and except for Belarusian nationals and permanent residents in the country.

Article XX

1. Staff members shall enjoy the following privileges, exemptions and facilities:

a) inviolability of official documents and papers related to the exercise of their functions;

b) exemption from restrictions to immigration and from procedures of registration of foreigners;

c) facilities for repatriation usually accorded to the personnel of international organizations in cases of international crisis;

d) exemption from income tax or any other direct taxes on salaries or retributions paid by the organization, and

e) exemption from any personal service and military service obligations or public service of any kind.

2. The privileges, exemptions and facilities agreed on subparagraphs b), c), d) and e) shall not be granted to Belarusian citizens or permanent residents in the Republic of Belarus.

3. The exercise of paid activity by dependants of the Head of Mission and staff members in Belarusian territory shall not be permitted, except in the case of Belarusian nationals or if authorized by a specific Agreement on the matter.

Article XXI

It is understood that the Head of Mission, the staff members and dependents enjoy the privileges, immunities and facilities set forth in the Vienna Convention on Diplomatic Relations; this does not apply to the situations covered by article XIII, paragraph 3 above.

Article XXII

ICRANet shall take adequate measures to resolve:

a) litigations deriving from contracts or other private law questions of which it is a party,

and

b) litigations to which the Head of Mission or a staff member who enjoys immunity by virtue of his (her) functions is a party.

Article XXIII

1. ICRANet shall cooperate with the competent authorities in order to facilitate the administration of justice and oversee the enforcement of the law.

2. No clause of this Agreement shall be interpreted as preventing the adoption of appropriate security measures in the interest of the Government.

Article XXIV

1. Privileges and immunities recognized in this Agreement are not granted to the Head of Mission or staff members for their own benefit, but in order to safeguard the independent exercise of their functions.

2. ICRANet has the right and the duty to renounce the immunity granted to it if it hinders the course of justice. In the case ICRANet does not renounce immunity, it must do its utmost to arrive at a fair solution of a litigation to which it is a party.

Article XXV

If the Government considers that an abuse of a privilege or immunity granted by virtue of this Agreement has occurred, it shall consult with ICRANet in order to determine whether such an abuse has taken place and, in that case, to prevent its recurrence.

Article XXVI

The number of staff members shall not exceed the limits suitable for the proper performance of the functions of the regional headquarters of ICRANet in the Republic of Belarus.

Article XXVII

ICRANet shall have the right to use codes and to dispatch and receive its correspondence by mail as well as by sealed pouch, which shall enjoy the same immunity and privileges granted to the diplomatic and consular representations headquartered in the territory of the Republic of Belarus, in accordance with the Vienna Convention on Diplomatic Relations.

Article XXVIII

ICRANet shall give written notice to the Government with the necessary advance of:

a) the appointment of the Head of Mission and staff members, as well as the engagement of local personnel, pointing out those who are Belarusian citizens or

permanent residents in the Republic of Belarus. Additionally, it shall give notice of the cessation of the functions of the aforementioned persons in ICRANet; and

b) the arrival and final departure of the Head of Mission and staff members, as well as that of the members of their respective families.

Article XXIX

The Government shall issue to the Head of Mission and staff members, once notice of their appointment has been received, a document of accreditation which shall specify the person's position and the nature of his (her) functions.

Article XXX

1. Each contracting Party shall notify the other of their compliance with the respective internal procedures for the entry into force of this Agreement, which shall take effect 30 (thirty) days after the date on which the second notification is received.

2. This Agreement shall be of indefinite duration. Any of its Parties may notify the other of its desire to denounce this Agreement. Termination shall be effective six (6) months after the date of the receipt of the notification to the other Party.

Article XXXI

The Parties may, by mutual consent, introduce modifications and amendments to this Agreement and shall be subject to the procedure set forth in paragraph 1 of Article XXX.

Done in Rome on _____, in duplicate, in the Russian and English languages, the texts being equally authentic.

FOR THE INTERNATIONAL CENTER FOR RELATIV1STIC ASTROPHYSICS NETWORK	FOR THE GOVERNMENT OF THE REPUBLIC OF BELARUS
_____	_____

Cooperation with the Belarusian State University (BSU)

On September 5, 2008 a Cooperation Agreement between ICRANet and the Belarusian State University (BSU) was signed by the director of ICRANet, prof. Remo Ruffini, and Rector of BSU, prof. Vasily Strazhev in Minsk, Belarus. This cooperation agreement has been renewed on August 26, 2013 by the director of ICRANet, prof. Remo Ruffini, and Rector of BSU, prof. Sergei Ablameyko.

Fig. 1 Opening of the Zeldovich meeting, organized by ICRANet and BSU. From left to right are the Rector of BSU, prof. Sergei Ablameyko, the director of ICRANet, prof. Remo Ruffini, and Dr. Gregory Vereshchagin. Minsk, 2009.

The goal of this agreement is to deepen the scientific and research cooperation, as well as to arrange bilateral seminars, make possible exchange of expertise, research and educational staff, publication of joint works. Within this agreement ICRANet has organized together with BSU the First Zeldovich meeting in Minsk in 2009.

In addition, within this agreement two PhD students from BSU, Yuri Tsalkou and Aleksander Tarasenko, visited ICRANet. Two undergraduate students at the Department of Theoretical Physics and Astrophysics of BSU, Svetlana Vlasenko and Ivan Rybak, were supervised by Prof. Gregory Vereshchagin in their course works.

New PhD student Nikolai Prokopenya has started his work under the supervision of Prof. Gregory Vereshchagin in 2017.

Belarusian State University

Agreement ICRANet - BSU

Rector
Andrei Karol

Signatories
Prof. Sergey V. Ablameyko
Prof. Alexander Gorbatsevich

Contact person
Prof. Alexander Gorbatsevich

ONGOING AND PREVIOUS ACTIVITIES

Joint Activities

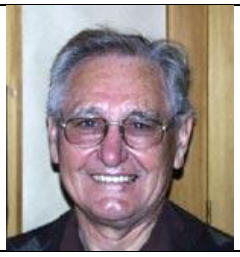
THE SUN, THE STAR, THE UNIVERSE AND GENERAL RELATIVITY The International Conference in Honor of Ya. B. Zeldovich 95th Anniversary

Belarusian State University, Minsk, Belarus, April 20-23, 2009

Visiting to ICRANet

	**Mikalai Prakapenia** Current position: PhD student, Belarusian State University
	Dr. Yuri Tsalkou PhD student, Belarusian State University
	Alexander Tarasenko PhD student, Belarusian State University

Visiting Professors to BSU

	**Dr. Alexei Aksenov** Participation in the: · *Zeldovich meeting*, 20-23 April 2009		**Prof. Hagen Kleinert** Participation in the: · *Zeldovich meeting*, 20-23 April 2009
	**Prof. Vladimir Belinski** Participation in the: · *Zeldovich meeting*, 20-23 April 2009		**Prof. Vladimir Popov** Participation in the: · *Zeldovich-100 Meeting*, 10-14 March 2014
	**Prof. Sandip Kumar Chakrabarti** Participation in the: · *Zeldovich meeting*, 20-23 April 2009		**Prof. Remo Ruffini - ICRANet Director**
	**Prof. Jaan Einasto** Participation in the: · *Zeldovich meeting*, 20-23 April 2009		**Prof. Gregory Vereshchagin**
	**Prof. Roy Patrick Kerr** Participation in the: · *Zeldovich meeting*, 20-23 April 2009		**Prof. She-Sheng Xue** Participation in the: · *Zeldovich meeting*, 20-23 April 2009

THE COOPERATION AGREEMENT
BETWEEN
INTERNATIONAL CENTER FOR RELATIVISTIC ASTROPHYSICS NETWORK
IN PESCARA, ITALY
AND THE BELARUSIAN STATE UNIVERSITY IN MINSK, BELARUS

International Center for Relativistic Astrophysics Network - ICRANet in Pescara (Italy) and the Belarusian State University (the Republic of Belarus), hereinafter referred to as 'Parties', having an intention to further deepen the scientific and research cooperation, have decided to sign the present Agreement.

Article 1

The participants in the implementation of the Cooperation Agreement from the Italian side will be:
ICRANet Coordinating Center in Pescara, Italy
and from the Belarusian side:
Belarusian State University in Minsk, Belarus

Article 2

The scientific and research cooperation will include:
1. Conducting joint research on scientific issues of interest to both Parties,
2. Arranging bilateral seminars,
3. Exchange of expertise between research and educational staff,
4. Publication of joint scientific works in international journals,
5. Exchange of publications, manuals and course books.

Article 3

1. The Parties will conduct the exchange of academic staff and students by means of formal letters of invitation. The invitations will be sent by the Director of ICRANet and the Rector of Belarusian State University.
2. The aim of the academic staff and students exchange is: participation in scientific conferences, seminars, symposiums as well as exchange of expertise, methodological training and joint discussions on up-to-date scientific issues of interest to both Parties.
3. By norm the exchange program will be done on reciprocal basis. All the travel expenses will be paid by the home institutions, while the local expenses will be paid by the receiving institutions. Motivated exceptions can be allowed.
4. Detailed conditions of realization of cooperation agreement and especially with regards to methods of financing, plan of exchanges of the academic staff and students of both parties will be specified in an Attachment to this Agreement.

Article 4

The present Agreement shall remain in force for five years, and will be automatically renovated for an equal period barring communication by either of the Parties, at least three months before the expiry of the Agreement, of its intention to withdraw the Agreement. Once signed, Agreement does not exclude a possibility of undertaking other cooperative activities which may be subject to annex to the present Agreement. Any changes in the content of the Agreement, as well as in the particular stages of joint activities, may only be performed in the written form with the approval of both Parties.

Article 5

The present Agreement is signed in two copies in English, and two copies in Russian, both texts are legally

valid. The two Parties receive one copy in either language.

Article 6

All disputes which might arise from this Agreement shall be resolved by the Director of ICRANet and Rector of the Belarusian State University, or by the persons authorized by them on the basis of the powers of attorney granted in writing in the process of the conciliation procedure.

Article 7

This Agreement shall be in force from the date of signing by both Parties

Agreement approved by:

International Center for Relativistic Astrophysics Network

Signature _____

Prof. Remo Ruffini

Belarusian State University

Signature _____

Prof. Sergey V. Ablameyko

Co-ordinators of the Co-operation

Signature _____

Dr. Gregory V. Vereshchagin

"26" August 2013

Signature _____

(Prof. Gorbatsevich A.K.)

"26" August 2013

Contact details of the Parties

International Center for Relativistic Astrophysics Network
P.le della Repubblica, 10, Pescara, Italy 65122
tel: +39-085-23054 / fax: +39-085-4219252
email: ruffini@icra.it

Belarusian State University
4, Nezavisimosti Ave., 220030,
Minsk, Belarus
tel./fax: +375-17-209-54-45
email: ablameyko@bsu.by

Cooperation with the National Academy of Sciences of Belarus

On September 6, 2013 a Cooperation Agreement between ICRANet and the National Academy of Sciences of Belarus (NASB) was signed by the director of ICRANet, prof. Remo Ruffini, and the Chief Scientific Secretary of NASB, prof. Sergei Kilin.

Within these agreement ICRANet has organized together with NASB in Minsk the Second Zeldovich meeting in 2014 as well as the Third Zeldovich meeting in 2018. The First ICRANet-Minsk workshop on high energy astrophysics has been held in Minsk in 2017.

In addition, a student from Belarus, Ivan Siutsou, was enrolled in the IRAP PhD program and successfully defended his thesis in 2013, receiving his PhD degree in relativistic astrophysics from all Universities participating in the program. He spend two years in Rio de Janeiro, Brazil, with a post-doc position within the ICRANet-CAPES program. Now he is researcher in ICRANet-Minsk.

ICRANet-Minsk center

On July 18, 2016 an Annex to the Cooperation Agreement between ICRANet and NASB was signed by the director of ICRANet, prof. Remo Ruffini, and the Chairman of NASB Presidium, prof. Vladimir Gusakov in Minsk, Belarus.

Fig. 2. Signature of the Annex to the Cooperation Agreement between ICRANet and NASB by the director of ICRANet, prof. Remo Ruffini, and Chairman of the Presidium of NASB, prof. Vladimir Gusakov. Minsk, 2016.

This document brought the collaboration between ICRANet and NASB to a new level and led to creation in Belarus of an ICRANet international academic center, ICRANet-Minsk. The ICRANet-Minsk center aims fostering scientific research in relativistic astrophysics, gravitation and cosmology in Belarus. The center is funded within the Belarusian state scientific program "Convergence", subprogram "Microworld and Universe" and it is located at the Stepanov Institute of Physics of NASB.

Fig. 3. Opening of ICRANet-Minsk center at the B.I. Stepanov Institute of Physics, 2017.

The staff of ICRANet-Minsk center includes the director, Academician Sergei Kilin and two researchers: Dr. Ivan Siutsou and Nikolai Prokopenya. Dr. Siutsou has graduated from the department of theoretical physics and astrophysics of the Belarusian State University, has received his PhD from the University of Rome Sapienza under the supervision of Dr. Gregory Vereshchagin in 2014 and spent two years as post-doc in CBPF in Rio de Janeiro, Brazil, within the ICRANet-CAPES program.

Nikolai Prokopenya is PhD student at the department of theoretical physics and astrophysics of the Belarusian State University where has started his work under the supervision of Dr. Gregory Vereshchagin in 2017.

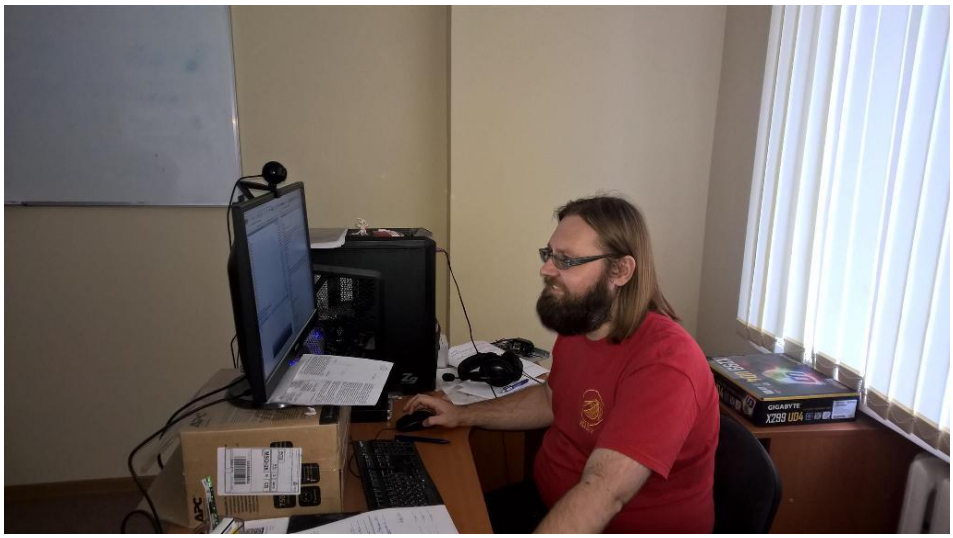


Fig. 4. Dr. Ivan Siutsou working at ICRANet-Minsk.

The scientific activities of ICRANet-Minsk center are coordinated by ICRANet and one of the ICRANet faculty members Dr. Gregory Vereshchagin is a frequent visitor at ICRANet-Minsk.

In 2017 ICRANet-Minsk center has organized the First ICRANet-Minsk workshop on high energy astrophysics in Belarus. It was a parallel meeting to a larger symposium BelINP-2017 on nuclear physics at the National Academy of Sciences of Belarus. This workshop was an opportunity for young scientists working in relativistic astrophysics from European and Asian countries to exchange experience and to present results in their fields to the Belarusian scientists. This

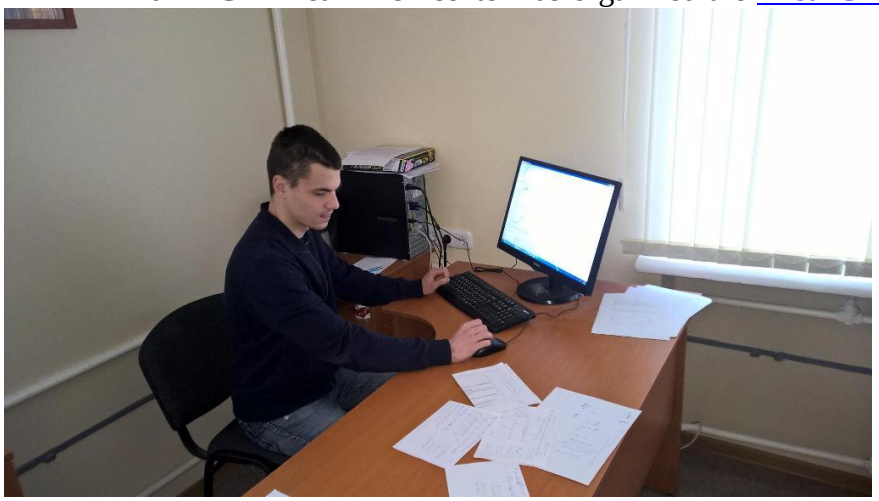
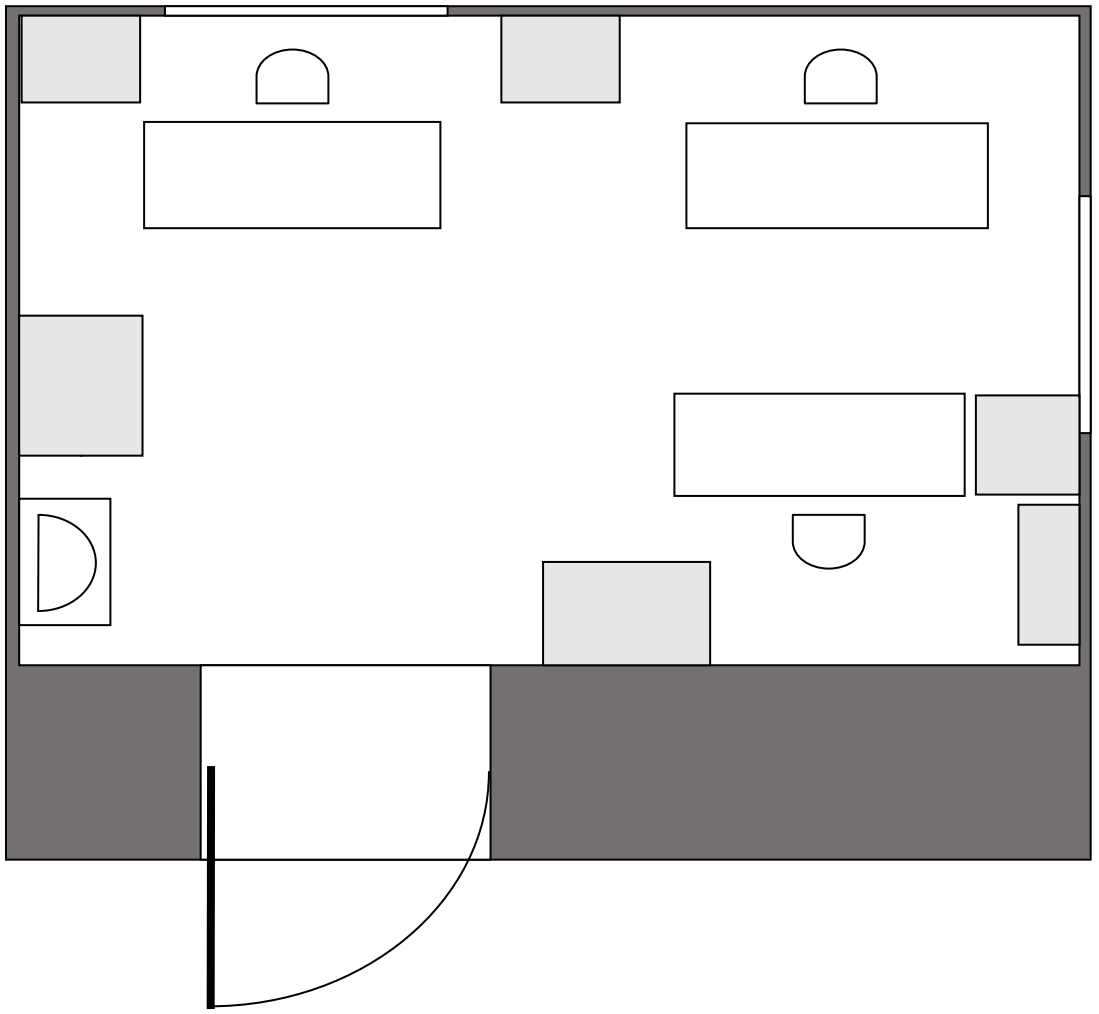


Fig. 5. Nikolai Prokopenya working at ICRANet-Minsk.

ICRANet-Minsk
Room 474 of the B.I. Stepanov Institute of Physics of the National Academy of Sciences of Belarus



event was organized within the 2017 Year of Science, declared by the Presidential decree.

Fig. 6. Dr. Gregory Vereshchagin discussing his D Sc doctorate thesis, December 2017.

In December 2017 ICRANet Faculty Professor Gregory Vereshchagin has defended his doctoral dissertation “Kinetics, hydrodynamics and radiation of relativistic plasma". In 2018 he has been awarded the Doctor of Sciences (D Sc) degree in theoretical physics.

Belarusian scientists visiting ICRANet

The collaboration agreements between ICRANet and the National Academy of Sciences of Belarus allows organization of exchange of scientific staff: Belarusian scientists visited ICRANet and ICRANet scientists visited Belarus.

- **Dr. Ivan Siutsou**
  Current position: Researcher at ICRANet-Minsk
  Previous positions: CAPES-ICRANet post-doc at CBPF 2014-2016
  Visited ICRANet in Pescara (Italy):
  From 2 to 31 May 2017
  From 15 September to 15 October 2017 (supported by MOST program, an EU funded project for enhancing professional contacts between Belarus and the EU)
  From 24 September to 22 October 2018

- **Dr. Yuri Vyblyi**
  Current Position: Researcher at the B.I. Stepanov Institute of Physics, NASB
  Visited ICRANet in Pescara (Italy) from 4 to 26 of Septeber 2017

- **Mikalai Prakapenia**
  Current position: Researcher at ICRANet-Minsk, PhD student, Belarusian State University
  Visited ICRANet in Pescara (Italy) from 1 to 27 of July 2018
  Presented a seminar: "Thermalization of electron-positron plasma with quantum degeneracy"
  From 17 to 26 of September 2019.

ICRANet scientists visiting Belarus

- **Prof. Remo Ruffini**
  Current position: Director of ICRANet, Italy
  Frequent visits to NASB in Minsk, Belarus: April 2017; July 2017; April 2018.

- **Prof. Gregory Vereshchagin**
  Current position: Faculty professor at ICRANet, Italy
  Frequent visits to NASB in Minsk, Belarus: April 2017; October 2017; December 2017; April 2018; August 2018.

- **Prof. Jorge Rueda**
  Current position: Faculty professor at ICRANet, Italy
  Visit to NASB in Minsk, Belarus: April 2018.

NASB scientists visiting ICRANet

- **Academician Sergei Kilin**
  Current position: Deputy chairman of the Presidium of NASB
  Visits to ICRANet: From 15 to 17 of December 2019

- **Prof. Yuri Vyblyi**
  Current position: leading researcher at the B.I. Stepanov Institute of Physics of NASB
  Visits to ICRANet: From 4 to 22 of September 2017 and from 5 to 15 of August 2019.

Publications with affiliation to ICRANet-Minsk

- G.V. Vereshchagin, "Cosmic horizon for GeV sources and photon-photon scattering", Astrophysics and Space Science 363:29 (2018).
- V.A. Belinski, G.V. Vereshchagin, "On the cosmological gravitational waves and cosmological distances", Physics Letters B, Volume 778 (2018) 332-338.
- N. O. Prokopenya, I. A. Siutsou, G. V. Vereshchagin, "Numerical scheme for treatment of Uehling-Uhlenbeck equation for two-particle interactions in relativistic plasma", J. Comput. Phys. 373 (2018) 533-544.
- N. O. Prokopenya, I. A. Siutsou, G. V. Vereshchagin, "Thermalization of electron-positron plasma with quantum degeneracy", Physics Letters A 383 (2019) 306-310.
- Suzana Bedic and G. V. Vereshchagin, "Probability of inflation in Loop Quantum Cosmology", Phys. Rev. D 99 (2019) 043512
- R. Ruffini, J. D. Melon Fuksman and G. V. Vereshchagin, "On the Role of a Cavity in the Hypernova Ejecta of GRB 190114C", The Astrophysical Journal, Vol. 884, Issue 1 (2019) article id. 191.

Zeldovich Meetings

ICRANet has initiated a series of international meetings in Minsk, Belarus, celebrating Yakov Borisovich Zeldovich, the famous Soviet physicist and astrophysicist.

From 1943, Zel'dovich played a crucial role in the development of the Soviet Union's nuclear bomb project. From 1963, he turned to cosmology and astrophysics, with pioneering contributions to these fields. He is known as a founder of the Russian school of Relativistic Astrophysics.

Exceptionally wide research interests of Ya. B. Zeldovich ranging from chemical physics, elementary particle and nuclear physics to astrophysics and cosmology provide the topics to be covered at these conferences:

- Early cosmology, large scale structure, cosmic microwave background;
- Neutron stars, black holes, gamma-ray bursts, supernovae, hypernovae;
- Ultra high energy particles;
- Gravitational waves.

Fig. 7. Prof. Remo Ruffini with close collaborators of Ya. B. Zeldovich in front of his monument in Minsk, 2014.

From 2009 to 2018 three international meetings in honor of Ya. B. Zeldovich have been organized in Belarus by ICRANet and co-sponsored by ICRANet, NASB, BSU, and the Central European Initiative.

Many participants at these conference are the members of the world-famous scientific school in astrophysics and cosmology, founded by Ya. B. Zeldovich, who are leading scientists in these fields in many countries worldwide including Germany, France, Italy, UK, USA and Russia.

The First Zeldovich meeting, 2009

Fig. 8. Participants of the First Zeldovich meeting in Minsk, 2009.

In 2009, within the celebration of the International Year of Astronomy, ICRANet organized the international conference, the First "Zeldovich meeting" in Minsk on April 20-23, 2009. Yakov Barosovich Zeldovich, the outstanding soviet scientist, was born in Minsk, Belarus, and the conference celebrated his 95th anniversary. The conference has created a stimulating environment for scientific exchange and contacts between scientists in the West, those coming from the great Russian school of Zeldovich, and local scientist from Belarus. Such internationally renowned scientists as Roy Kerr, Hagen Kleinert, Nikolay Shakura attended the conference and presented talks there. In addition, a memorable public lectures were given by Remo Ruffini, Gregory Vereshchagin and Vladimir Kurt, as well as a round table with participation of Zeldovich collaborators such as Vladimir Belinski, Valeri Chechetkin, Jaan Einasto, Vladimir Kurt, Vladimir Popov, and Nikolai Shakura, was organized. The proceeding of the meeting were published by the American Institute of Physics, in volume 1205 of AIP conference proceedings.

The Second Zeldovich meeting, 2014

Fig. 7. Participants to the Second Zeldovich meeting in Minsk, 2014.

In 2014, the 100th anniversary of Yakov Barosovich Zeldovich was celebrated with many international conferences. The first international meeting in this series was the Second Zeldovich meeting in Minsk. Many of the lecturers at the conference were the closest former collaborators of Ya. B. Zeldovich. Many young researchers took part in the meeting. In particular, the students from International Relativistic Astrophysics PhD program, including both CAPES-ICRANet and Erasmus Mundus program, participated in the conference and presented results of their scientific work. The conference was jointly organized by ICRANet and the National Academy of Sciences of Belarus. The opening address was given by Nobel Laureate prof. Zhores Ivanovich Alferov and by Prof. Remo Ruffini. There were more than 80 participants, nationals of Argentina, Armenia, Belarus, Brazil, China, Germany, India, Italy, Kazakhstan, Poland, Russia, and other countries. The conference covered many topics including cosmology, relativistic astrophysics, general relativity, elementary particle and nuclear physics, detonations and explosions.

Fig. 9. Nobel Laureate prof. Zhores Alferov addresses participants of the Second Zeldovich meeting in Minsk, 2017.

Plenary papers are published in the leading Russian journal on astronomy and astrophysics, Astronomy Reports, vol. Volume 59, Issues 6 and 7. Regular contributions are published in special open access issue of Nonlinear Phenomena in Complex Systems, Vol. 17 No 4 (2014).

The Third Zeldovich meeting, 2018

Fig. 10. Participants to the Third Zeldovich meeting in Minsk, 2018.

The Third Zeldovich meeting was held in April 23-27, 2018 in Minsk, Belarus. The conference was jointly organized by ICRANet and the National Academy of Sciences of Belarus. The meeting was sponsored by these two organizations and by the Central European Initiative (CEI).

About 80 participants, nationals of Argentina, Armenia, Belarus, Bosnia and Herzegovina, China, Colombia, Germany, Hungary, Italy, Kazakhstan, Poland, Russia, Slovenia, Taiwan, Ukraine and other countries took part in the meeting.

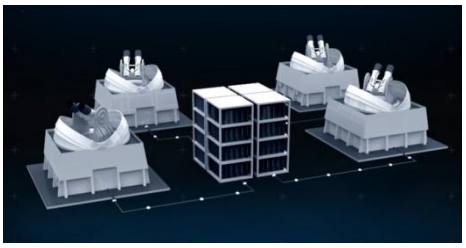
Fig. 11. Profs. Vladimir Fortov, Sergei Kilin, Remo Ruffini and Gregory Vereshchagin. The Third Zeldovich meeting in Minsk, 2018.

The conference covered many topics including cosmology, relativistic astrophysics, general relativity, elementary particle and nuclear physics, detonations and explosions. This celebration was the third international conference in Minsk dedicated to Ya. B. Zeldovich. The previous meetings were held on 20-23 of April 2009 and was organized jointly by ICRANet and Belarusian State University celebrating also the 2009 Year of Astronomy, and on March 11-14, 2014 celebrating 100th

anniversary of Ya. B. Zeldovich.

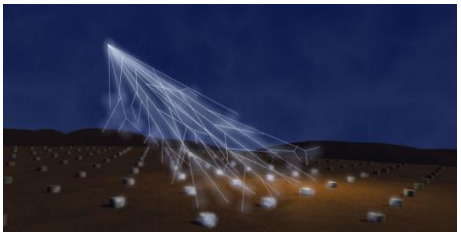
For the first time international collaborations present their recent scientific results at the 3rd Zeldovich meeting in Minsk, Belarus:

Vladimir Lipunov, on behalf of MASTER-Net project
Talk: "*The Discovery of gravitational waves: prediction and observation*"



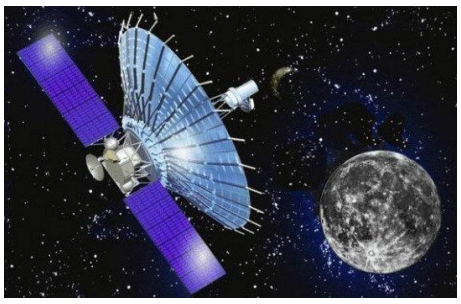
MASTER is very fast positioning alert, follow up and survey twin telecopes Global network with own real-time auto-detection software. The main goal of the MASTER-Net project is to produce a unique fast sky survey with all sky observed over a single night down to a limiting magnitude of 19-20.
Participating countries: Russia, Argentina, Spain, South Africa.

Jaroslaw Stasielak, on behalf of Pierre Auger collaboration
Talk: "Highlights on the ultra-high energy cosmic rays studies at the Pierre Auger Observatory"



The Pierre Auger Observatory is an international cosmic ray observatory in Argentina designed to detect ultra-high-energy cosmic rays: sub-atomic particles traveling nearly at the speed of light and each with energies beyond 10^{18} eV.
The Pierre Auger Collaboration includes over 500 scientists from Argentina, Australia, Brazil, Croatia, the Czech Republic, France, Germany, Italy, Mexico, Netherlands, Poland, Portugal, Roumania, Slovenia, Spain, the United Kingdom, and the United States of America.

Mikhail Lisakov, on behalf of RadioAstron space mission



Talk: "Recent results from RadioAstron"
The RadioAstron is an international space VLBI project led by the Astro Space Center of Lebedev Physical Institute in Moscow, Russia. It is a Russian scientific satellite with a 10 m radio telescope on board. It was launched on 18 July 2011,[7] by Zenit-3F launcher, from Baikonur Cosmodrome to perform research on the structure and dynamics of radio sources within and beyond our galaxy. Together with some of the largest ground-based radio telescopes, this telescope forms interferometric baselines extending up to 350,000 km.

Bronislav Rudak, on behalf of H.E.S.S. collaboration
Talk: "Science highlights from H.E.S.S."

High Energy Stereoscopic System (H.E.S.S.) is a system of Imaging Atmospheric Cherenkov Telescopes (IACT) for the investigation of cosmic gamma rays in the photon energy range of 0.03 to 100 TeV. The acronym was chosen in honour of Victor Hess, who was the first to observe cosmic rays. H.E.S.S. is located on the Cranz family farm, Göllschau, in Namibia. Participating countries: Germany, France, United Kingdom, Namibia, South Africa, Ireland, Armenia, Poland, Australia, Austria, Sweden, Netherlands, Japan.

Arkady Galper, on behalf of Gamma-400 project

Talk: "Gamma-400 project"

GAMMA-400 (Gamma Astronomical Multifunctional Modular Apparatus) scientific complex is an international astrophysics space laboratory, designed to obtain the data on determining the dark matter nature in the universe, to develop the theory of origin of high-energy cosmic rays and the elementary particle physics, to investigate cosmic gamma-ray emission in the high-energy range of 20 MeV – 1000 GeV and X-ray emission in the energy range of 5-30 keV, to detect cosmic rays, and to search for and study gamma-ray bursts.

Many young researchers took part in the meeting. In particular, the students from International Relativistic Astrophysics PhD program participated in the conference and presented results of their scientific work.

In addition, many local researchers were involved in the meeting, not only from Minsk but from other scientific centers in Brest and Gomel.

Important scientific developments were discussed at the conference. In particular, the concept of induced gravitational collapse leading to cosmic Gamma-Ray Bursts was presented in detail. The role of dark energy in cosmological structure formation on different scales was extensively discussed. The conference has created a stimulating environment for further scientific exchange and contacts between scientists in the West, those coming from the great Russian school of Zeldovich, and local scientist from Belarus.

The Fourth Zeldovich meeting will be held on April 20-24, 2020 in Minsk, Belarus. Participation from neighbouring countries such as Estonia, Latvia, Lithuania, Poland, Russia and Ukraine as well as from Balkan countries, Eastern and Western Europe and the Americas is expected. Exceptionally wide research interests of Ya. B. Zeldovich ranging from chemical physics, elementary particle and nuclear physics to astrophysics and cosmology provide the topics to be covered at the conference, which will include: early cosmology, large scale structure, cosmic microwave background, neutron stars, black holes, gamma-ray bursts, supernovae, hypernovae, ultra high energy particles, gravitational waves.

The meeting will be held in the National Academy of Sciences of Belarus and financial support will be provided by ICRANet, National Academy of Sciences and Central European Initiative.

The list of confirmed invited speakers includes:

- Abhay Ashtekar, Institute for Gravitation & the Cosmos, Penn State University, USA
- Rong-Gen Cai, Institute of Theoretical Physics, Chinese Academy of Sciences, China
- Jens Chluba, Jodrell Bank Centre for Astrophysics, University of Manchester, UK
- Alexander Dolgov, Novosibirsk State University and ITEP, Russia
- Jaan Einasto, Tartu Observatory, Estonia

- Stefan Gillessen, Max Planck Institute for Extraterrestrial Physics, Germany
- Claus Lämmerzahl, ZARM, Germany
- Vladimir Lipunov, Moscow State University, Russia
- Felix Mirabel, CEA Saclay, France
- Slava Mukhanov, Ludwig-Maximilians-Universität München, Germany
- Konstantin Postnov , Sternberg Astronomical Institute, Russia
- Piero Rosati, University of Ferrara, Italy
- Jorge Rueda, ICRANet, Italy
- Remo Ruffini, ICRANet, Italy
- Nikolay Shakura, Sternberg Astronomical Institute of the Moscow State University, Russia
- Dmitry Sokoloff, Moscow State University, Russia
- Alexey Starobinsky, Landau institute for theoretical physics, RAS, Russia

A satellite event "MODERN PROBLEMS IN PHYSICS 2020" will be organized by the B.I. Stepanov Institute of Physics of the National Academy of Sciences of Belarus.

LIST OF PUBLICATIONS
of Belarusian scientists associated with ICRANet

Books:

G.V. Vereshchagin and A.G. Aksenov, "Relativistic Kinetic Theory", Moscow: Nauka, 2018, in press (in Russian).

G.V. Vereshchagin and A.G. Aksenov, "Relativistic Kinetic Theory With Applications in Astrophysics and Cosmology", Cambridge University Press, 2017, 334 pages. ISBN: 9781107048225.

G.V.Vereshchagin, "Relativistic Kinetic Theory with some Applications", in: Cosmology and Gravitation: XVth Brazilian School of Cosmology and Gravitation, eds. Mario Novello and Santiago E.Perez Bergliaffa, Cambridge Scientific Publishers, ISBN 978-1-908106-39-1 2014, pp 1-40.

G.V. Vereshchagin, "Gauge Theories of Gravity with the Scalar Field in Cosmology", in "Frontiers in Field Theory", edited by O. Kovras, Nova Science Publishers, New York, 2005, pp. 213-255 (ISBN: 1-59454-127-2).

Refereed journals:

1. R. Ruffini, J. D. Melon Fuksman and G. V. Vereshchagin, "On the Role of a Cavity in the Hypernova Ejecta of GRB 190114C", The Astrophysical Journal, Vol. 884, Issue 1 (2019) article id. 191.
2. M. A. Prakapenia, I. A. Siutsou and G. V. Vereshchagin, "Thermalization of electron-positron plasma with quantum degeneracy", Physics Letters A 383 (2019) 306-310.
3. Suzana Bedic and G. V. Vereshchagin, "Probability of inflation in Loop Quantum Cosmology", Phys. Rev. D 99 (2019) 043512.
4. M. A. Prakapenia, I. A. Siutsou, and G. V. Vereshchagin, "Numerical scheme for treatment of Uehling–Uhlenbeck equation for two-particle interactions in relativistic plasma", Journal of Computational Physics, Volume 373 (2018), pp. 533–544.
5. V. A. Belinski and G. V. Vereshchagin, "On the cosmological gravitational waves and cosmological distances", Physics Letters B, Volume 778 (2018), pp. 332-338.
6. G. V. Vereshchagin, "Cosmic horizon for GeV sources and photon-photon scattering", Astrophysics and Space Science, Vol. 363:29 (2018).
7. R. Ruffini, G.V. Vereshchagin and Y. Wang, "Thermal emission in the early afterglow of gamma-ray bursts from their interaction with supernova ejecta", A&A, Vol. 600 (2017) id.A131, 7 pp.
8. R. Ruffini, G.V. Vereshchagin and S.-S. Xue, "Cosmic absorption of ultra high energy particles", Astrophysics and Space Science, Vol. 361:82 (2016).
9. A. G. Aksenov, R. Ruffini, and G. V. Vereshchagin, "Radiative transfer in relativistic plasma outflows and comptonization of photons near the photosphere", Astronomy Reports, Vol. 59, No. 6, (2015) pp. 418–424.

10. D. Begue and G.V. Vereshchagin, "Transparency of an instantaneously created electron-positron-photon plasma", MNRAS, Vol. 439 (2014), pp. 924-928.
11. I.A. Siutsou and G.V. Vereshchagin, "Relativistic spotlight", Physics Letters B, Volume 730 (2014), pp. 190–192.
12. G.V. Vereshchagin, "Physics of non-dissipative ultrarelativistic photospheres", International Journal of Modern Physics D Vol. 23, No. 1 (2014) 1430003.
13. I.A. Siutsou, R. Ruffini and G.V. Vereshchagin, "Spreading of ultrarelativistically expanding shell: an application to GRBs", New Astronomy, Vol. 27 (2014), pp. 30-33.
14. I. Siutsou, C.R. Argüelles, R. Ruffini. Dark matter massive fermions and Einasto profiles in galactic haloes // Astronomy Reports. – 2015. – V. 59, № 7. – P. 656–666.
15. C.R. Argüelles, R. Ruffini, I. Siutsou, B. Fraga. On the distribution of dark matter in galaxies: Quantum treatments // Journal of the Korean Physical Society. 65 (2014) 801-804.
16. K. Boshkayev, J. Rueda, R. Ruffini, I. Siutsou. General relativistic white dwarfs and their astrophysical implications // Journal of the Korean Physical Society. 65 (2014) 855-860.
17. K. Boshkayev, D. Bini, J. Rueda, A. Geralico, M. Muccino, I. Siutsou. What can we extract from quasiperiodic oscillations? // Gravitation and Cosmology. 20 (2014) 233-239.
18. R. Ruffini, C.R. Argüelles, B.M.O. Fraga, A. Geralico, J.A. Rueda, and I. Siutsou. Black Holes in Gamma-Ray Bursts and Galactic Nuclei // Int.J.Mod.Phys. D. 22 (2013).
19. Kuantay Boshkayev, Jorge A. Rueda, Remo Ruffini, Ivan Siutsou. On general relativistic uniformly rotating white dwarfs // Astrophys.J. 762 (2013) 117 (14pp).
20. A.G. Aksenov, R. Ruffini and G.V. Vereshchagin, "Comptonization of photons near the photosphere of relativistic outflows", MNRAS Letters, Vol. 436, Issue 1 (2013) pp. L54-L58.
21. R. Ruffini, I.A. Siutsou and G.V. Vereshchagin, "Theory of photospheric emission from relativistic outflows", The Astrophysical Journal, Vol. 772, Issue 1 (2013) article id. 11.
22. D. Begue, I. A. Siutsou, G. V. Vereshchagin, "Monte Carlo simulations of the photospheric emission in GRBs", The Astrophysical Journal, Vol. 767, Issue 2 (2013) article id. 139.
23. A. Benedetti, R. Ruffini and G.V. Vereshchagin, "Phase space evolution of pairs created in strong electric fields", Physics Letters A, Vol. 377 (2013) 206–215.
24. A. Benedetti, W.-B. Han, R. Ruffini and G.V. Vereshchagin, "On the frequency of oscillations in the pair plasma generated by a strong electric field", Physics Letters B, Vol. 698 (2011) 75-79.
25. A.G. Aksenov, R. Ruffini and G.V. Vereshchagin, "Pair plasma relaxation time scales", Physical Review E, Vol. 81 (2010) 046401.
26. R. Ruffini, G.V. Vereshchagin and S.-S. Xue, "Electron-positron pairs in physics and astrophysics: from heavy nuclei to black holes" Physics Reports, Vol. 487 (2010) No 1-4, pp. 1-140.
27. A.G. Aksenov, R. Ruffini and G.V. Vereshchagin, "Thermalization of the mildly relativistic plasma", Physical Review D, Vol. 79 (2009) 043008.
28. G.V. Vereshchagin and G. Yegorian, "Dynamics of perturbations in Gurzadyan-Xue cosmological models", International Journal of Modern Physics D, Vol. 17 (2008) No 2, pp. 203-223.

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30. R. Ruffini, G.V. Vereshchagin and S.-S. Xue, "Vacuum polarization and plasma oscillations", Physics Letters A, Vol. 371 (2007) No 5-6, pp. 399-405.
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32. H.G. Khachatryan, G.V. Vereshchagin and G. Yegorian, "Luminosity distance in GX cosmological models", Il Nuovo Cimento B, Vol. 122 (2007) No 2, pp. 197-200.
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37. G.V. Vereshchagin, G. Yegorian, "Hidden invariance in Gurzadyan-Xue cosmological models", Physics Letters B, Vol. 636, (2006) pp. 150-153.
38. G.V. Vereshchagin, "Physical constants and the Gurzadyan-Xue formula for the dark energy", Modern Physics Letters A, Vol. 21, (2006) No. 9, pp. 729-733.
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43. I.A. Siutsou, A. G. Aksenov and G. V. Vereshchagin, "On thermalization of electron-positron-photon plasma" in the Proceedings of The Second Cesar Lattes meeting, AIP Conference Proceedings 1693 (2015) 070007.
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54. R. Ruffini, and G. V. Vereshchagin, S.-S. Xue, "Vacuum Polarization and Electron-Positron Plasma Oscillations" in RELATIVISTIC ASTROPHYSICS: 4th Italian-Sino Workshop, AIP Conference Proceedings, Vol. 966, Melville, New York, 2008, pp. 207-212.

55. R. Ruffini, M. G. Bernardini, C. L. Bianco, L. Caito, P. Chardonnet, M. G. Dainotti, F. Fraschetti, R. Guida, M. Rotondo, G. Vereshchagin, L. Vitagliano, S.-S. Xue, "The Blackholic energy and the canonical Gamma-Ray Burst" in Cosmology and Gravitation: XIIth Brazilian School of Cosmology and Gravitation, edited by M. Novello and S.E. Perez Bergliaffa, AIP Conference Proceedings, Vol. 910, Melville, New York, 2007, pp. 55-217.

56. M. Lattanzi, R. Ruffini and G.V. Vereshchagin, "Do WMAP data constraint the lepton asymmetry of the Universe to be zero?" in Albert Einstein Century International Conference, edited by J.-M. Alimi, and A. Füzfa, AIP Conference Proceedings, Vol. 861, Melville, New York, 2006, pp.912-919.

57. R. Ruffini, C.L. Bianco, G.V. Vereshchagin, S.-S. Xue "Baryonic loading and e+e- rate equation in GRB sources" in Relativistic Astrophysics and Cosmology – Einstein's Legacy, ESO Astrophysics Symposia, Springer, Berlin, 2008, pp. 402-406.

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THE SUN, THE STARS, THE UNIVERSE AND GENERAL RELATIVITY

INTERNATIONAL CONFERENCE IN HONOR OF YA. B. ZELDOVICH'S 95th ANNIVERSARY

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Moments with Yakov Borisovich Zeldovich

Remo Ruffini

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Abstract. A recollection of special moments spent with Yakov Borisovich Zeldovich and with the scientists of Soviet Union and abroad.

The first impression upon meeting a person is the one which characterizes all subsequent interactions.

I met Yakov Borisovich Zeldovich for the first time in 1968 at the GR5 meeting in Tbilisi. I had known his name from his two classic papers on relativistic astrophysics in Physics Uspekhi coauthored with Igor Novikov [1, 2]. There had been a strong impulse to boycott the GR5 meeting due to the tense relations over human rights between the Soviet Union and the USA at that time. Finally a small group around Johnny Wheeler decided to participate. Among them were Arthur Komar, Bruce Partridge, Abe Taub and myself.

It was also my first visit to the Soviet Union. The entrance to Leningrad was already very special showing the difference in organization from our Western world. I will recall elsewhere some of the anecdotes. It was in the airplane to Tbilisi that a very particular experience occurred. The year 1968 was a time in which dissent was growing in the Soviet Union and the New York Times had just written an article on Andrei Sakharov and his reflections on peaceful coexistence and intellectual freedom. I boarded the plane for Tbilisi with Arthur Komar. We sat in the last row of a quite modern jet plane with open seats and shining windows, and we were commenting and laughing on all those stories we had heard in the West about windowless seats reserved for westerners on Soviet planes. When the plane was almost full the stewardess called the names of Arthur Komar and Remo Ruffini asked us to move to seats reserved for us in the front of the plane. We were delighted and we considered this an honor. Our two seats were in a line of three seats ... the only ones in the plane without a window. We were quite upset. In between us there was a third person who did not seem to speak English. So we started complaining about these methods and commenting appropriately also about Sakharov's recent opinions as presented in the New York Times and asking ourselves about the fate of Sakharov after his open statements. The plane was supposed to be a direct flight to Tbilisi of approximately seven hours. After approximately three hours of flight, without any announcement, the plane abruptly started to descend quite rapidly and landed in a town called Mineralnye Vody. After landing there was a lot of confusion, there were additional planes and finally it was disclosed that, as a common practice in the Soviet Union in the presence of bad weather, the plane had stopped and we would continue the flight the morning after. It was also announced that for foreigners there would be *a* room to sleep. Soon after I realized that there was only one room for all the foreigners! Since it was impossible to sleep I went back to the airport hall and I noticed this person who had been sitting between me and Komar on the plane to be alone in the hall and had found a chair. He was seating quietly waiting for the morning. I was attracted by his silence and his self-control. I approached him introducing myself: "Ruffini, Italy." To this his answer: "Sakharov, Soviet Union!" I still remember his serene smile. He was the first Soviet scientist I met on the way to our meeting in Tbilisi. The arrival in Tbilisi with Kumar and Sakharov was marked by the fortunate encounter with other monumental scientific figures.

We had the marvelous opportunity to meet some historical figures like Vladimir Fock, Iosif Shklovsky and Alexei Petrov and also Dmitry Ivanenko. It was amusing to see the ceremonial relations between Fock and Ivanenko. Fock, who as expected was always in the first row, had a conspicuous auditorial "apparat." Every time Ivanenko was taking the floor to speak, Fock was disconnecting his "apparat" with a very explicit gesture. In addition of course there was Yakov Borisovich surrounded by a large number of then young collaborators including Gennady Bisnovatyi-Kogan, Valery Chechetkin, Viktor Shvartsman, Nikolay Shakura, Alexei Starobinsky, Rashid Sunyaev, Sergei Shandarin and others. Zeldovich was encouraging all his students to attack in their scientific presentations almost like a boxer ring trainer.

The first day of the meeting Zeldovich invited me to lunch and asked me just at the beginning to speak about my research. I started to explain my work on self-gravitating bosons I had started in Rome and just recon-

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Figure 1. Solvay meeting of 1933. The series of photos from the Solvay meetings has been kindly given to ICRANet by Jacques Solvay, the descendant of Ernest Solvay in occasion of the assignment of the Marcel Grossman award to the Solvay foundation. Gamow is on the last row, perfectly symmetric with respect to other participants.

sidered after an interaction with the Pascual Jordan group in Hamburg. Indeed it was there that we realized that the previous treatment on Einstein-Klein-Gordon fields had a fatal error in the energy-momentum tensor leading to meaningless results. Later the correct work was completed by myself at Princeton and the published paper [3] became known as the paper in which the new concept of Boson Stars was introduced. After my first words Yakov Borisovich stopped me. I asked why. He stated "How long did you speak?" I answered "approximately forty seconds." To that he replied "If Landau would have been here he would have stopped you after twenty seconds." To that I immediately replied somewhat amused and self-confident "I do not think so, I am sure Landau would have said how new is this idea and he would have approved my considerations." He followed then my presentation of the new results and more polite and constructive discussions followed for the rest of the lunch. We also talked about George Gamow. Zeldovich recalled the animosity of all Soviet physicists towards Gamow since he did not return to Moscow after the famous Solvay meeting of 1933, see figure 1. By this action Gamow hampered the possibility for all Soviet physicists to travel abroad after that date. He recalled how he was motivated by a matter of pure confrontation against Gamow for some time. As soon as Gamow presented the theory of a hot universe he himself presented an alternative theory of a cold universe, initially at zero temperature [4]. The process of building up heavy elements was stopped in his theory by the presence of a degenerate sea neutrinos and only hydrogen would be born from an expanding Friedman universe. He stressed again, how building such a theory was motivated ideologically and politically. He recognized the crucial role of the Penzias and Wilson discovery of the cosmic microwave background radiation which disproved his 'political' theory and proved instead the validity of Gamow's theory[1]. He finally con-

[1] I have made recollection of all this in a recent publication in [5].

cluded "Yes: although Gamow made many mistakes he is one of the greatest Soviet scientists!" And then recalling the fundamental contributions Gamow made to the understanding of the DNA structure he asked: "How many Nobel prizes did Gamow receive? Two?" I answered: "None." And I was surprised how distant he was from our world.

Paradoxically the work of neutrinos in cosmology was later reproposed by Viktor Shvartsman [6] by considering the role of the many neutrino species and in general to the number of "difficult to observe particles with zero rest mass". In that paper Viktor, see figure 2 established his classical result of an upper limit to the number of neutrino species $N_\nu \leq 3$ assuming that the chemical potential of the electron neutrino be zero. This result signed a new

Figure 2. Picture of Viktor Shvartsman taken by myself in Moscow in 1975. Among the students of Zeldovich I was most impressed by Viktor. We reproduced one of his fundamental works in one of our book [22]. It was clear to all of us that his isolation in the Caucasian mountains, so far from the world of Moscow and the world of theoretical research he was so strongly aiming for, was a key factor in the tragic epilogue of his life.

beginning in the dark matter problem in the Universe. I myself worked later on the role of massive neutrinos in cosmology. I considered their fundamental role both in cosmological nucleosynthesis [7] and in formation of the structure in the Universe due to dark matter, leading to a fractal structure of the Universe [8].

But let us go back to Zeldovich: we became very good friends in the following years, and I regularly met him in Moscow. We had also the great pleasure to share so many common friends. In particular, I remember many interactions with Bruno Pontecorvo, see figure 3. In particular,

Figure 3. Picture taken by myself in an unplanned visit to an hospital in Moscow. On the left side Zeldovich, on the right side Pontecorvo.

with the participation of Bruno and Italian television we produced a documentary "Il caso neutrino" recovering the fundamental moments of the discovery of the neutrino all the way to the determination of their mass and their role in cosmology [9].

Since 1973 I had the great fortune to become a very close friend of Evgeny Lifshitz. He had just granted to me and John Wheeler the honor of being quoted in a named exercise in the volume "Theory of Fields" of his classic series with Landau. As we became more familiar with Evgeny, I developed a profound admiration of his intellectual abilities, of his understanding of physics and of his moral stature. Evgeny often recalled a series of anecdotes. One of the best aphorisms of Landau: "Astrophysicists often in error, never in doubt," and a different one related not only to astrophysicists but to physicists at large: "Due to the shortness of our lives we cannot afford the luxury to spend time on topics which are not promising successful new results". It was Evgeny who made me aware of some additional peculiarities in Zeldovich's character.

Lifshitz described that famous argument on the equation of state of neutron stars. Zeldovich first challenged the concept of the critical mass of the neutron star using an ad hoc model of supranuclear density interaction [10]. He had then purported the possibility of having an equation of state with the speed of sound equal to the speed of light, see [11]. Lifshitz then recalled that Landau did not want "to offend" the intelligence of colleague physicists. If an issue was very difficult and important he would explain this issue. In other cases he was not going to explain and would ask the person to answer himself. In the specific case of the extreme equation of state

Figure 4. The picture of Li-Zhi Fang with his wife, myself, Leopold Halpern, Volodia Belinski and his wife at the Rimini Meeting of CL of 1991.

Figure 5. Dinner at Lifshitz home in Moscow (circa 1985). At the center Evgeny Lifshitz and, on his left, Zeldovich and Vitaly Ginzburg with their wifes. Picture taken by my wife Anna Imponente.

Figure 6. Picture taken by myself.

$p = \rho$ of Zeldovich he simply told him "wrong!", and to Zeldovich's request "why?" he simply answered "you find out." This was before the tragic Landau car accident. After the accident Landau was no longer in any condition to give a proof of the statement, and Zeldovich was unable to give a proof either. One day at the restaurant of the Academy in Leninsky Prospect, Yakov Borisovich asked Evgeny in my presence "Why you did not insert my equation of state in the Landau and Lifshitz book?"

Figure 7. Ya. B. Zeldovich monument in Minsk in front of National Academy of Sciences of Belarus.

Figure 8. The picture of George Coyne and myself greeting John Paul II.

To this Lifshitz replied "Did you solve the problem assigned by Landau?", and to that Zeldovich said "No.", and to that Lifshitz's answer was "Then I do not quote the result in the Landau and Lifshitz book."

Figure 9. I look with terror Zeldovich approaching the Pope John Paul II clearly with an unidentified object disguised under his jacket.

Figure 10. Zeldovich presenting his books to Pope John Paul II.

Figure 11. Zeldovich after the presentation of his books. To the offering of the books the Pope said "Thanks" and Zeldovich very loudly shouted "Not just 'thanks' ! These are fifty years of my work!" The Pope kept Zeldovich's collected papers under his arm during the entire rest of the audience.

My visit to Moscow was specially joyful due to the interactions with so many extraordinary scientists like Aleksandr Prokhorov, Isaac Khalatnikov, Pavel Cherenkov, Vitaly Ginzburg and others kindly invited to lunch with me in the Italian Embassy by the then Italian ambassador Sergio Romano and his predecessors. Encounter with Khalatnikov was especially productive. Khalat was the founder of the Landau Institute. However, among the others faculty members was Vladimir Belinski. The friendship with Lifshitz and Khalat soon extended to Volodia. So much so, that it transfered to Italy with his wife Elena, see figure 4, and became Italian citizen and one of the first faculty members of the newly founded ICRANet since 2005. Also extremely pleasant were the meetings at Yevgeny's home with friends and their wives, see figures 5 and 6. One very special occasion took place in Moscow. One day I was visiting Yakov Borisovich in his Institute. He said "Come and see a present I received from my friends in Minsk, where I was born." And he showed me a bronze statue of him-

Figure 12. Picture of Wheeler, Christodoulou and myself in Fine Hall in Princeton in the former office of Albert Einstein. The picture is taken in front of the fireplace where Einstein wrote with charcle, and now is engraved in gothic scripture in the marble, the famous sentence "Raffiniert ist der HerrGott, aber boshaft ist er nicht".

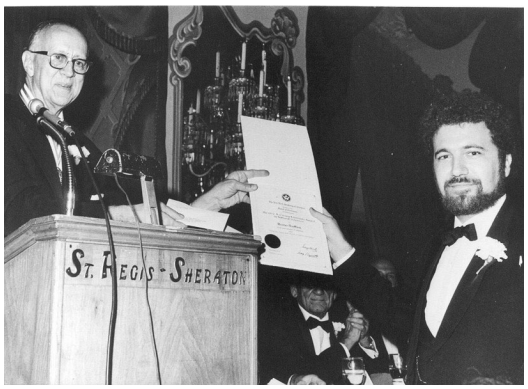

Figure 13. Receiving the Cressy Morrison Award of the New York Academy of Sciences in 1972.

Figure 14. Solvay meeting of 1973.

self. I told him "Congratulations, I can finally say that I have a friend with the bronze face!" using the Italian meaning "faccia di bronzo" which are not very complementary words addressed to someone who is insensitive to problems. Full of these memories I was delighted to see in the city of Minsk, now reconstructed and rebuilt, in the serenity of the spring his statue in form of a monument in front of the Academy of Sciences, see figure 7.

In 1985 I decided to create an international consortium dedicated to the field of relativistic astrophysics, the International Center for Relativistic Astrophysics (ICRA). This consortium relates the University of Rome "La Sapienza" to the University of Stanford, and the Space Telescope Institute at the USA, the University of Science and Technology in Hofei, China, the Specola Vaticana and the ICTP. It was coherently founded by George Coyne, Li-Zhi Fang, Francis Everitt, Riccardo Giacconi, Abdus Salam, and myself, see figure 8.

The most unique occasion with Zeldovich came in 1986 in Rome during the visit of the four delegations of the space research program of Europe, Japan, Soviet Union and the USA in occasion of the Halley comet mission. ICRA organized the meeting at "La Sapienza" and the Vatican. It was the first time Zeldovich could come to the West as a member of a very exceptional delegation created by Roald Sagdeev for this epochal meeting. There are many anecdotes with Zeldovich being shocked by a number of cars in the Italian streets and proposing to help himself with one since in his opinion it would be impossible to trace back the real owner. I did successfully convince him no to proceed in such an idea. Entering in the "Sala Regia" in the Vatican he attempted to seat in the first row and to my request to take his assigned seat in the 21st row seeing all the remaining ones still empty he said "Nobody will notice me in the first row." I insisted that he should come back to the seat assigned to him by the Vatican ceremonial office. After few minutes he realized that the first rows were occupied on one side by the cardinals, the bishops and personnel

of the Vatican, and on the other side by the ambassadors to the Vatican all in their sumptuous vests. Certainly the presence of Zeldovich in the first row would have been quite obvious and unjustifiable! But the surprises were not yet over. I was supposed to introduce him to the Pope during the audience with the members of the delegations. And I saw Zeldovich approaching with a clearly large object under his jacket. I was terrified, see figure 9.

Suddenly Zeldovich opened the jacket in front of John Paul II, extracted two books and put them into the hands of the Pope John Paul II, see figure 10. His holiness said "Thank you very much, professor Zeldovich", and to this with a very loud voice which penetrated the entire "Sala Regia" Zeldovich forcefully replied "Not just 'thanks'! These are fifty years of my work!" There was a great laugh from everybody as they relaxed. Later on John Paul II recalled that this was one of joyful audiences he had ever had. And he kept the two large red volumes over his white robe during the entire audience, see figure 11.

Finally I would like to remark that a great scientist can even make a great discovery when he participates in some irrational actions. In the late fifties when the race to the Moon between the US and the Soviet Union was on someone proposed to show the great technical ability in the space vehicles and in the nuclear technology proposing to the Soviet superiority to explode at a fixed time an atomic bomb on the Moon[2]. This awful project fortunately was never implemented. Nevertheless it was one of the motivations to develop a highly secret mission from the United States in order to test the no proliferation agreement: the Vela satellites. These satellites were conceived to patrol all the region around the Earth and the Moon for possible nuclear explosions! Everybody knows today that this led to the discovery of gamma-ray bursts and we were very honored and pleased to announce their discovery at the 1972 AAAS meeting in San Francisco which was chaired by Herb Gursky and myself [14].

In 1987 I visited Zeldovich in Moscow for the last time. There was a meeting at the Academy of Sciences on cosmology. While he went to deliver his talk he asked me to keep his jacket with the three gold stars and red stripes of the Hero of Socialist Labor. He was among the few people to have three such decorations. They told me that even Stalin had only one such "star". I was not surprised. By that time I had become aware of his many contributions in ignition, combustion, explosions as well as of his work with Yulii Khariton and Igor Kurchatov on the atomic bomb. Slowly but inevitable I became also aware of the role of John Wheeler in the American H-bomb project. Of course it was clear they had done an

[2] Different versions exist of this story. Some presented direct involvement of Zeldovich [12], some show Zeldovich as an opponent of this idea on technical grounds [13].

Figure 15. Jonhy enjoying the pictures of Jacopo in 1999.

Figure 16. Picture of Ginette and Johny Wheeler with Anna in High Island with Ginette holding one of her preferred Gucci scarf.

Figure 17. Picture taken in my office at "La Sapienza" of Vladimir Popov surrounded by Gregory Vereshchagin, She-Sheng Xue and myself in 2006.

Figure 18. The picture of the participants of the Varenna summer school. In the second row Anthony Hewish (Nobel Prize, 1974), Joe Taylor (Nobel Prize, 1993), Subrahmanyan Chandrasekhar (Nobel Prize, 1983) and Riccardo Giacconi (Nobel Prize, 2002).

enormous work in the physics of the bomb and also it was evident that they had learned one of the greatest amount of physics reachable at the time.

When it came to the work on Relativistic Astrophysics I was surprised to see that this vast quantity of knowledge in physics they had acquired in making the bombs did not help as much as one would have expected. They were somewhat overshooting and did not catch the beauty, the different and possibly more profound physical scientific complexity, and also the conceptual simplicity of the new phenomena. In the case of Wheeler the interactions with him during the first years in Princeton had be tremendously intense. At times we were working 13 hours a day. We wrote that celebrated article for Phyiscs Today [17], recently reprinted [18], in which we were presenting for the first time a Black Hole as a physical object and not just as a mathematical solutions. Such an object was indeed interacting actively with the rest of the Universe by a vast amount of energy, in principle extractable: the rotational and the electromagnetic energy. These works were received an exponential growth with the coming to Princeton of Demetrios Christodoulou from Greece at the age of 16. When he started his thesis of PhD at the age of 18 Demetrios approached the problem suggested by Wheeler of the collapse of a scalar field forming a black hole which he finally solved in 2009 [19]. A second part of his thesis was developed under my guidance [5] which has led to the general mass formula of the black hole [24], see figure 12. Interestingly precisely these concepts have made later the Black Holes through their "Blackholic energy" the explanation of Gamma Ray Bursts [25]: the largest instantaneous energy sources in the Universe second only to the Big Bang [5, 20, 21]. In collaboration with Rees we also wrote a book giving guidelines for the study of Black Holes, Gravitational Waves and Cosmology [22]. The field of Relativistic Astrophysics started to grow exponentially after the introduction of X Ray Astronomy by Riccardo Giacconi and his group [23]. Paradoxically Wheeler interest started to depart from these topics and drifted toward a (possibly too) vast field of exploring the world of mathematics in the quest for better expressing the laws of physics, see also my recollections in [5]. It was that time in which I proposed the paradigm for the first identification of a Black Hole in our Galaxy [26], see figure 13.

A profound separation of scientific interests had already occurred in those days at the Les Houches summer school: the first one solely dedicated to black holes [27]. After that event I dedicated myself to the study of Black Holes larger than 3.2 solar masses. While S. Hawking and his group directed all the attention to mini black holes (see e.g. [28]). The field of matter accretion on a Black Hole was not developed in the West and became dominated by the Russian (see Titarchuk contribution to

this volume) and Indian schools (see Chakrabarti contribution to this volume). In the case of Wheeler a different point of view on the role of European scientists in the United States of America emerged, and a separation of our scientific interest became manifest in the 1973 Solvay meeting (see figure 14), which was followed by my return to Europe. These differences did not affect in any way the deep friendship between us extended to our families, see figures 15 and 16.

In the case of Zeldovich some similar event happened. I was trying to make him appreciate the beauty of the work I was developing with an American hero of Relativistic Astrophysics, Jim Wilson, himself a distinguished participants of the American Bomb projects. The work on the relativistic magnetohydrodynamics effect around Black Holes have today reached the greatest interest for microquasars and active galactic nuclei explanations [29]. To that he was answering with his interests toward the possible radiation of a rotating sphere due to quantum effects. To me that work did nor appear so promising in view of the intrinsic stability imposed by quantum effects on a rotating system.

Thinking over my scientific discussions with Zeldovich I was especially admiring his work with Vladimir Popov on heavy nuclei, as expressed in our recent report [21]. On this topic see also Popov's contribution in this book. This topic has become central to our current research, see figure 17.

In all my discussions with Zeldovich through the seventies I was particularly eager to illustrate to him my work on the black hole identification and to observe his feedback. Much of these works, following the Solvay meeting, were summarized in our celebrated Varenna summer school, see figure 18. This basic work then appeared in the book [15] which is currently being reprinted [16]. That epochal meeting in the scientific content was followed until today by three Nobel Prize winners among the lecturers as S. Chandrasekhar (1983), J. Taylor (1993), and R. Giacconi (2002), see figure 19.

But let us return after this digression to my last meeting with Zeldovich. While he was speaking Sakharov entered the room and sat in the first row near me. He had just been permitted to return to Moscow after the Gorky exile. I had just been helping at the University of Rome to attribute to him a *laurea honoris causa - in absenzia*. I looked at him closely: the face had changed from the Tbilisi days, his smile was gone and his gentle aspect had been modified. Even the structure of the face was somewhat more tense with a more prominent jaw. I gave my hand to him: "Ruffini, Italy" and his immediate answer recalling a serene expression resembling the old days "Sakharov, Soviet Union!"

In June 1988 on the hundredth anniversary of the birth of Alexander Alexandrovich Friedman we went to Leningrad with Werner Israel and a few other relativists. It was a very emotional occasion to find the tomb of Friedman and put some flowers on it. Yakov Borisovich Zeldovich had died on December 2, 1987. This was the occasion of a trip by night sleeping train between Moscow and Leningrad with my wife Anna.

Figure 19. Picture of Riccardo Giacconi receiving the Nobel Prize.

Figure 20. Television broadcast made by Igor Novikov, Andrei Sakharov and myself in the celebration of Alexander Alexandrovich Friedman's 100th Anniversary, Leningrad, 1988.

The next compartment on that train was occupied by Andrei Sakharov and Elena Bonner. The day after a memorable broadcast from the television was made by Igor Novikov, Andrei Sakharov and myself in the celebration of Alexander Alexandrovich Friedman, see figure 20.

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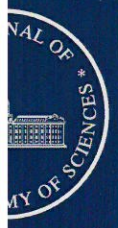

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НЕЛИНЕЙНЫЕ ЯВЛЕНИЯ В СЛОЖНЫХ СИСТЕМАХ

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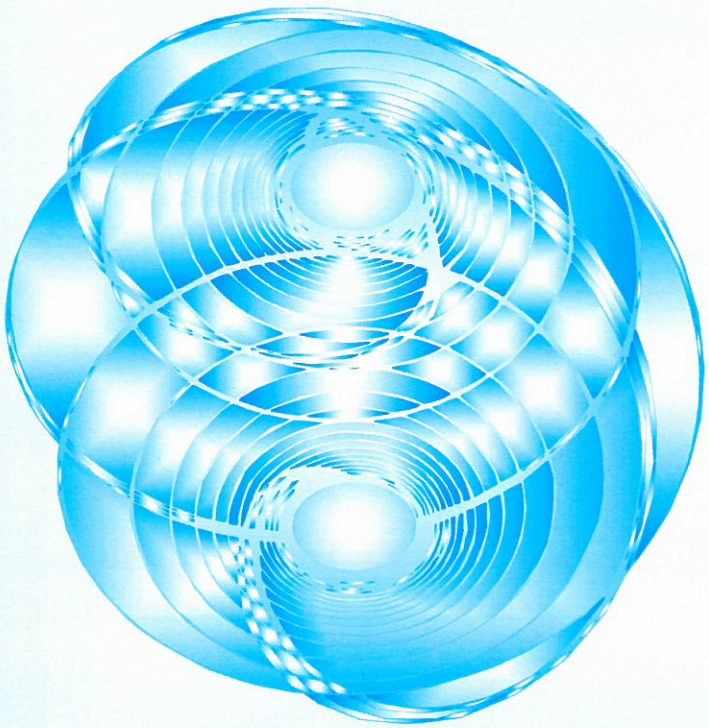

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Status of the request of adhesion of China

Collaborations in Relativistic Astrophysics with China

The exchange in the field of astrophysics between Italy and China has a long history dating back to the transfer to China of a telescope by Lì Mădòu (Matteo Ricci) and the translation in Chinese of the Euclid's books by his student Xu Guangqi in the 16th century.

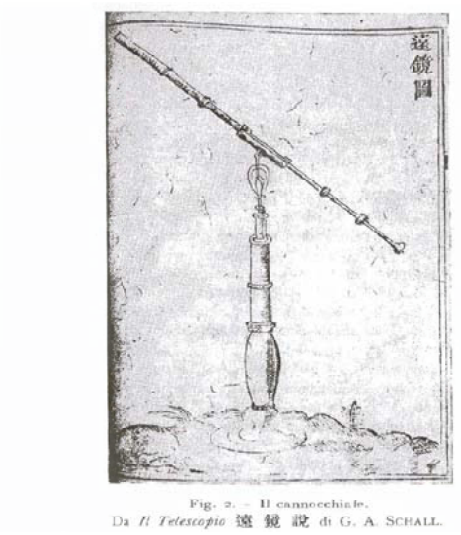
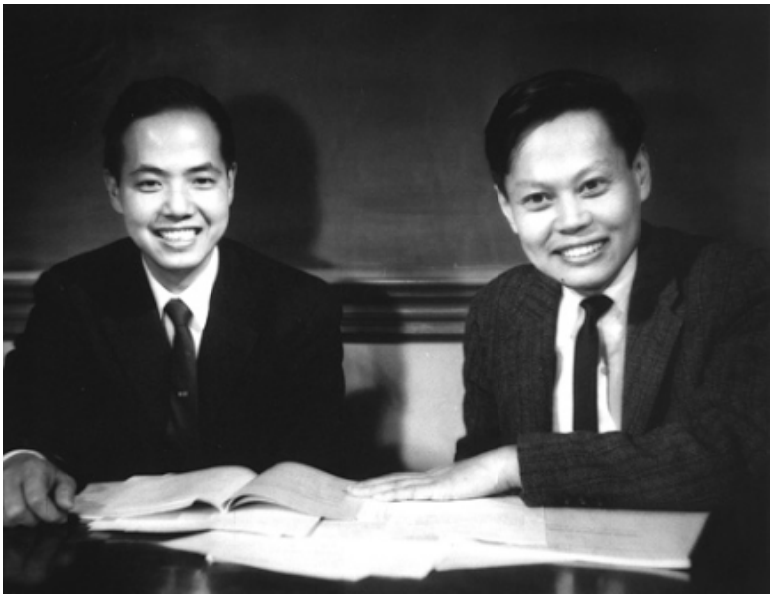


Fig. 2. - Il cannocchiale.
Da *Il Telescopio* 遠 鏡 說 di G. A. SCHALL.

In recent years the modern contributions in the field of Astrophysics has been carried forward by professor T.D. Lee and in the fields of Relativistic Field Theories and Einstein General Relativity Theory by professor C.N. Yang, both Nobel Laureates in 1956. They both were Chinese students of Enrico Fermi in 1940s.



Following the first visit to China of professor Remo Ruffini in 1978, by invitation of the Chinese Academy of Sciences (CAS) a vast number of collaborations have started in the field of Relativistic Astrophysics, following the classic article "Introducing the Black Hole" by Remo Ruffini and John Archibald Wheeler (Physics Today, January 1971, pages 30-41) in the Institute Advance Study (IAS) at Princeton.

The first visit of prof Remo Ruffini to China, Beijing and Tsinghua Universities, National Observatories of CAS

Based on a series of lectures delivered in China, Li Zhi Fang and Remo Ruffini wrote book "Basic Concepts of Relativistic Astrophysics" (World Scientific, 1983, Chinese version, Shanghai Scientific publisher 1981).

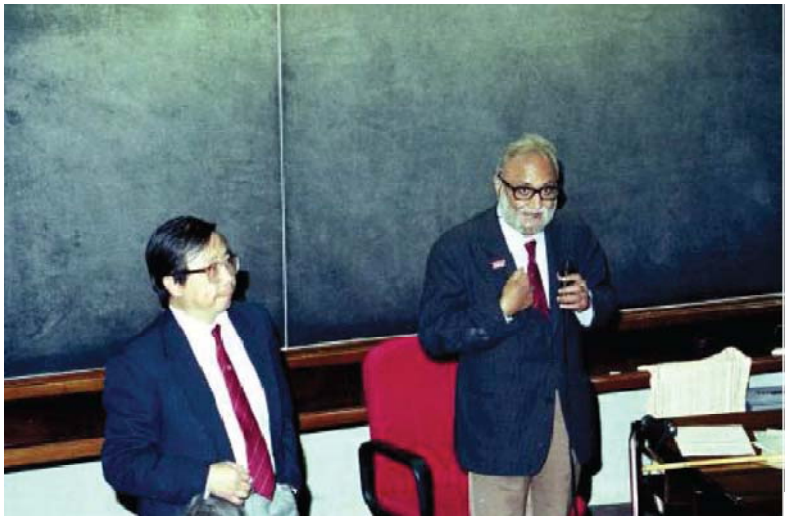
This fundamental and didactical book has been worldwide used by undergraduate and graduate students for many generations.

In 1982, with Nobel Laureate and president of the International center of theoretical physics (ICTP) prof. Abdus Salam and the president of China Association for Science and Technology (CAST) prof. Zhou Peiyuan, prof. Remo Ruffini organized

3rd Marcel Grossmann Meeting, Shanghai (China), 1982. http://www.icranet.org/MGMeetings
Proceedings was edited by prof Hu Ning of Beijing University and Institute of theoretical physics (ITP), Chinese Academy Science (CAS). This was the first international scientific meeting participated by important western scientists in China after the cultural revolution, greatly impacting on not only Chinese and western scientific communities, but also the government policy "opening door to the world" advocated by Premier Deng Xiao Ping in that time.

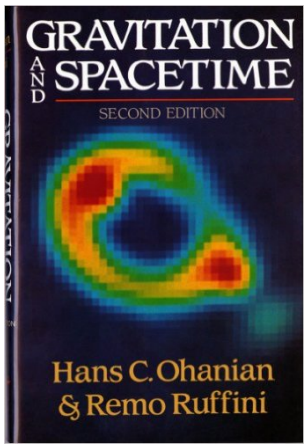
Premier Zhou En Lei and prof. Abdus Salam in 1965

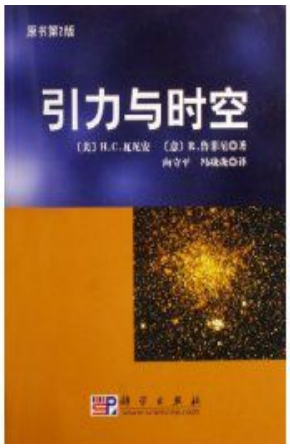
Since then, the collaboration between China and Italy grew exponentially and the attention was turned to foster a collaboration also with the US and to strengthen relations between China and the US, ICTP and the Vatican Observatory. Together in 1985 we created the International Center for Relativistic Astrophysics (ICRA) at
the University of Rome "la Sapienza" with founding members Riccardo Giacconi
(Baltimore Space Telescope Institute), Abdus Salam (ICTP and TWAS), George Coyne (Vatican Observatory), Remo Ruffini (University of Rome, la Sapienza"), and Fang Lizhi (University of Science and Technology in Hefei, USTC). ICRA has been the foundation for many successful developments and training Chinese scientists in Relativistic Astrophysics.



ICRA members: Nobel Laureates Riccardo Giacconi and Abdus Salam, prof Li Zhi Fang

A large number of Chinese students have received their PhD in Italy, a large number of Chinese researches and post-docs have visited ICRA, and then been recommended to visit other western Institutions, among them Jing Yi-Peng, Li Miao, Feng Long-Long, Gao Jian-Gong, Xian Shuo-Ping and others, they became leading professors in important Institutions after their return to China. A large number of joint publications have appeared in international journals and many advanced scientific books have been published in Chinese, English and Italian. As example, the advanced monograph on the Einstein General relativity, "Gravitation and Spacetime" by Hans C. Ohanian and Remo Ruffini (W.W. Norton & Company, 1994) was translated into Chinese (Chinese Scientific publisher, 2006) by Prof. Ruffini former students Xiang Shou-Ping and Feng Long-Long, and now is an important referenced book in Chinese and Western Universities.

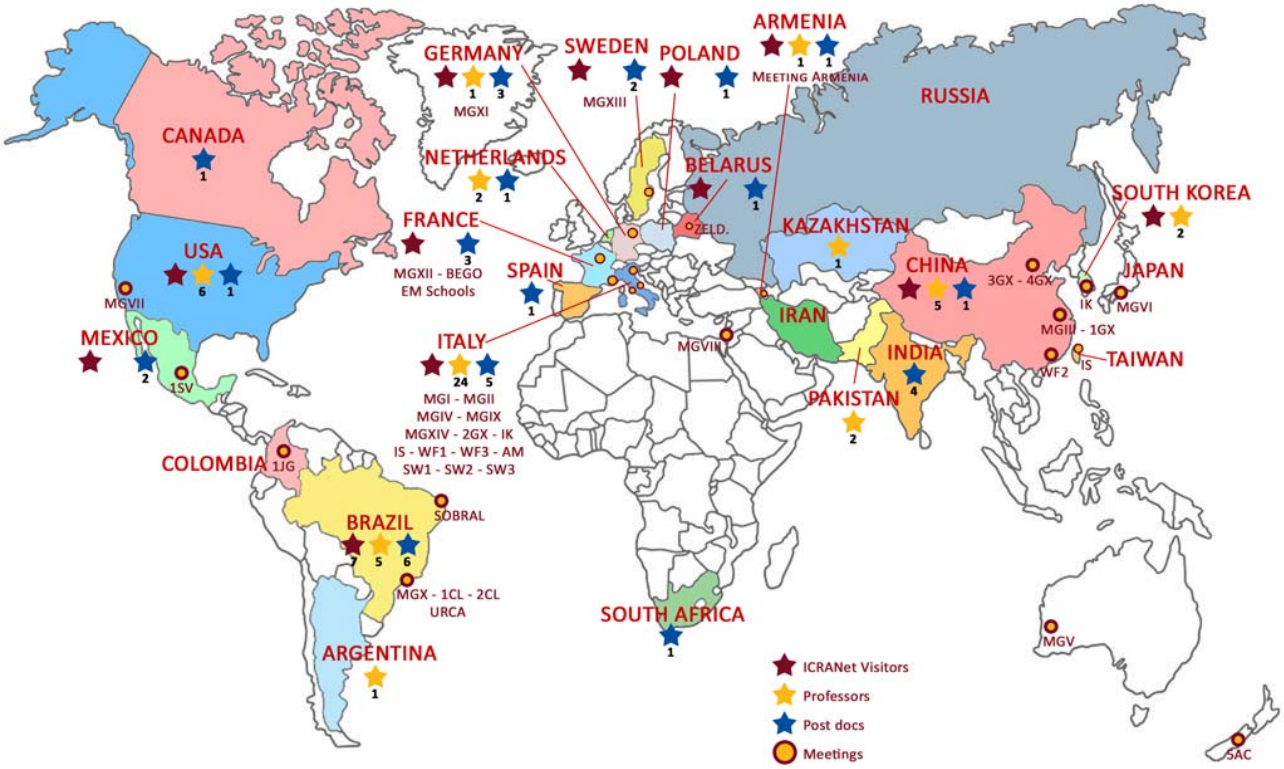




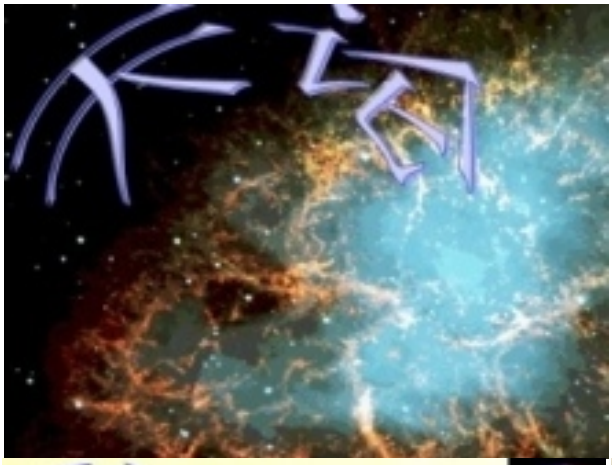
On March 19, 2003, the Establishment and the Statute of ICRANet were signed and recognized in the same year by the Republic of Armenia and the Vatican State. ICRANet has been created in 2005 by a law of the Italian Government, ratified by the Italian Parliament and signed by the President of the Italian Republic Carlo Azeglio Ciampi on February 10, 2005. The Republic of Armenia, Italy, the Vatican State, ICRA, the University of Arizona and the Stanford University are the founding members.

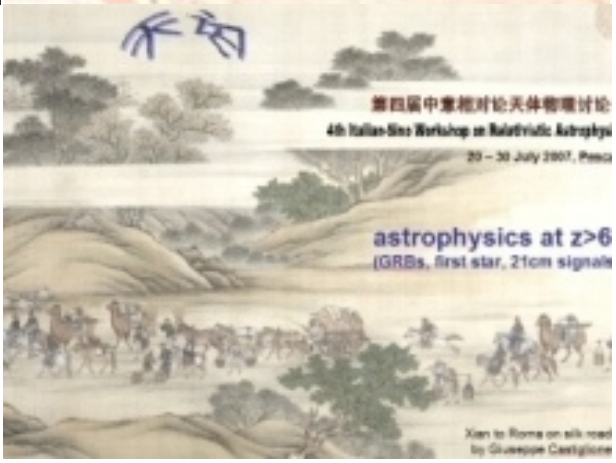
On September 12, 2005 the Steering Committee was established and had its first meeting. Remo Ruffini and Fang Li-Zhi were appointed respectively Director and Chairman of the Steering Committee. On December 19, 2006 the Scientific Committee was established and had its first meeting in Washington DC. prof. Riccardo Giacconi was appointed Chairman and prof. John Mester (Stanford University) Co-Chairman.

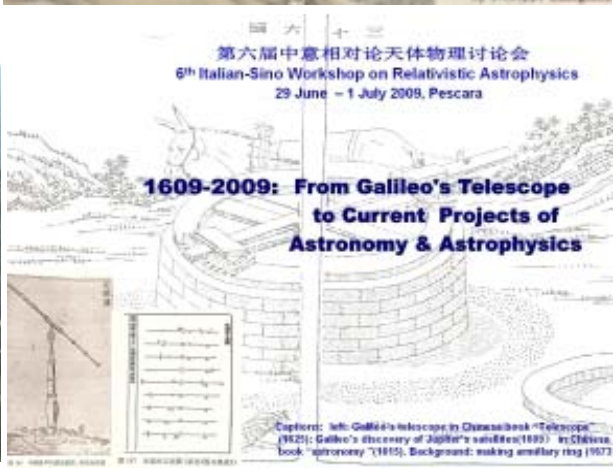
On September 21, 2005 the Director of ICRANet signed with the Ambassador of Brazil Dante Coelho De Lima the adhesion of the Federative Republic of Brazil to ICRANet. The entrance of Brazil, requested by the President of Brazil Luiz Ignácio Lula Da Silva has been unanimously ratified by the Brazilian Parliament. On August 12, 2011 the President of Brazil Dilma Rousseff signed the entrance of Brazil in ICRANet. This map illustratively indicates ICRANet scientific activities and connections, including international scientific agreements, conferences, workshops, adjunct professors and exchanged visitors of professors, postdoctors and students in countries and scientific institutions worldwide, see here.



From 2004 to 2008, in the coordinate center of ICRANet at Pescara, Italy, a series of six Italian-Sino workshops on cosmology and relativistic astrophysics have been established by Profs. Remo Ruffini and Li Zhi Fang. These workshops were participated by both western, Chinese, oversee Chinese researches and Ph.D. students in the frontier of research of Relativistic Astrophysics. Chinese participants were hosted by ICRANet and supported by Chinese research fund for their travels. They all are nowadays key elements of Chinese international scientific projects in cooperation with western scientific communities in many active research fields. It should be mentioned that one of these meeting was in Nice University, France, another hosted and supported by Chinese Academia Sinica and universities in Taiwan.
http://www.icranet.org/IS-Workshops

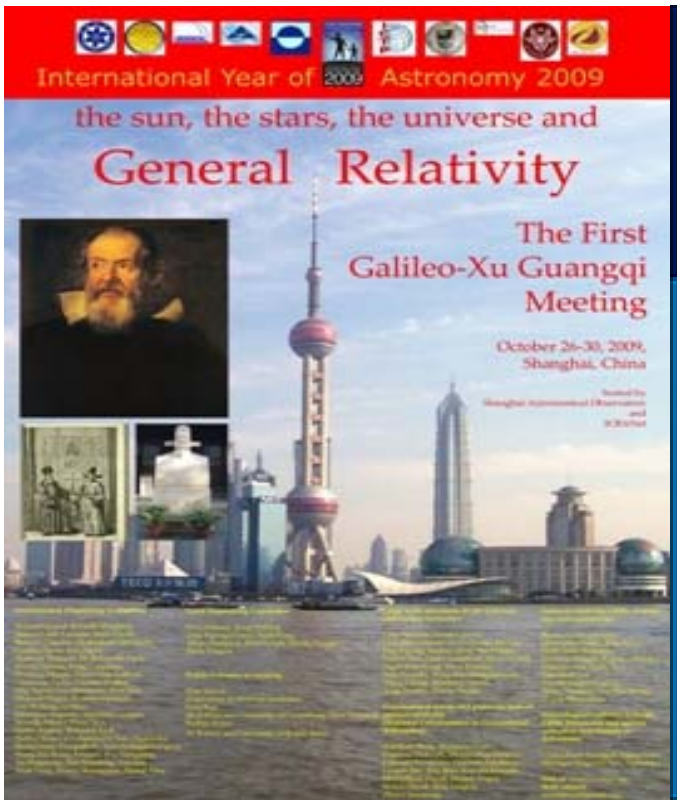


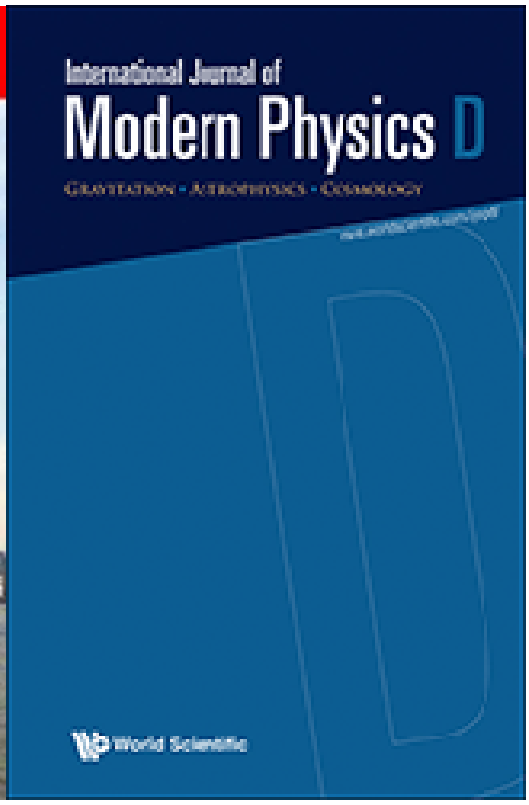




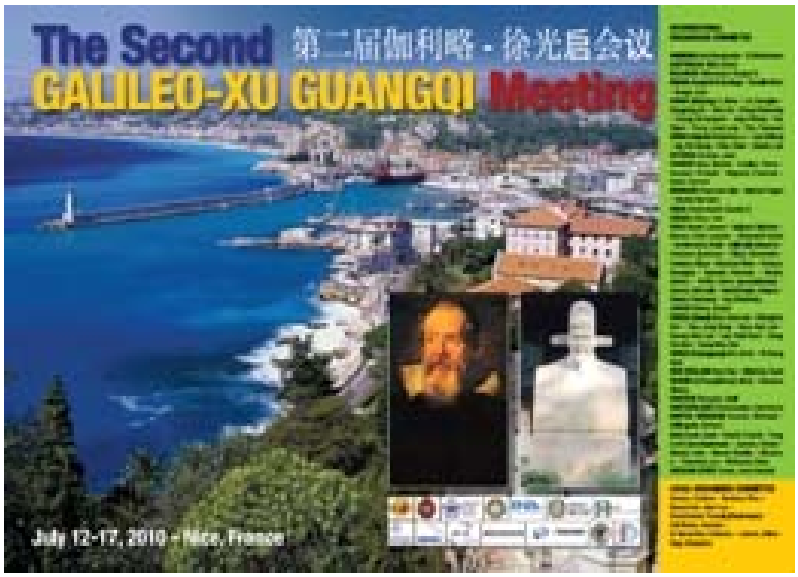
From 2009 to present, a series of joint meetings by ICRANet and Chinese Institutions joint meetings has regularly been established in China, namely, The Galileo Xu Guangqi (GX) meetings http://www.icranet.org/GXMeetings

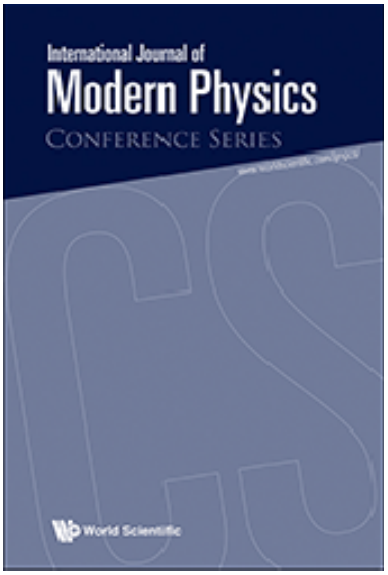
- 1st Galileo-Xu Guangqi Meeting, Shanghai (China), 2009 was organized by the Shanghai Observatory, CAS, Shanghai Jiao Tong University and ICRANet. Proceedings was edited by David Blair, Jing Yi Peng, Remo Ruffini, SheSheng Xue, http://www.worldscientific.com/toc/ijmpd/20/10





- 2nd Galileo-Xu Guangqi Meeting, Ventimiglia (Italy) and Nice (France), 2010 was organized by the Nice University, Beijing Observatory, CAS and ICRANet. Proceedings was edited by Remo Ruffini, http://www.worldscientific.com/toc/ijmpcs/12





- 3rd Galileo-Xu Guangqi Meeting, Beijing (China), 2011 was organized by Chinese National Observatory, CAS and ICRANet. Proceedings was edited by Zhen Cao, Xuelei Chen, Remo Ruffini, SheSheng Xue, Chengmin Zhang, Shuangnan Zhang; http://www.worldscientific.com/toc/ijmpd/22/11

- 4th Galileo-Xu Guangqi Meeting, Beijing (China), 2015 was organized by the ITP, Kavli Institute for Theoretical Physics in China at the Chinese Academy of Science (KITPC) and ICRANet to have an International Conference on Gravitation and Cosmology also for celebrating the 100 years anniversary of Einstein General Relativity. The conference was also cosponsored by the State Key Laboratory of Theoretical Physics (SKLTP/ITP-CAS), Kavli Institute for Theoretical Physics China (KITPC/ITP-CAS), Gravitation and Relativistic Astrophysics division of Chinese Physics Society (CPS), International Center for Theoretical Physics-Asian Pacific (ICTP-AP), Chinese Center for Advanced Science and Technology (CCAST), Yunnan Observatories at Chinese Academy of Sciences, Department of Astronomy at the University of Science and Technology of China (USTC), International College of University of Chinese Academy of Sciences (IC-UCAS), the Theoretical Physics Center for Science Facilities (TPCSF) at the Chinese Academy of Sciences (CAS), and ICRANet.

The Conference Proceedings was edited by Rong-gen Cai, Remo Ruffini, Yue-liang Wu.

These meetings were very successful, with more than hundred participants and most of them were from China, provided a platform for exchanging scientific idea both on theoretical and experimental aspects, in fact, many preliminary proposals of Chinese international scientific projects were first reported and discussed during these meetings. All these meetings in China were partially supported by the Neutral Science Foundation of China (NSFC) and other Chinese financial agencies.

It should be mentioned that in this most recent meeting GX4, Beijing, 2015, profs. T. D. Lee and C.N Yang received the Marcel Grassmann awards for their fundamental contributions to modern science in 20 century. The Vice president Zhang Yaping of CAS participated this great event of ceremony.

The Marcel Grassmann awards were delivered on May 4, 2015 at the MG14 satellite meeting the International Conference on Gravitation and Cosmology: the Fourth Galileo-Xu Guangqi Meeting in Beijing:

Goes to
FRANK C.N. YANG
"for deepening Einstein's geometrical approach to physics in the best tradition of Paul Dirac and Hermann Weyl"
Delivered at 9:50 am

Goes to
T.D. LEE (award received by Yu-Qing Lou on behalf of Prof. T.D. Lee)
"for his work on white dwarfs motivating Enrico Fermi's return to astrophysics and guiding the basic understanding of neutron star matter and fields"
Delivered at 7:00 pm

FRANK C.N. YANG

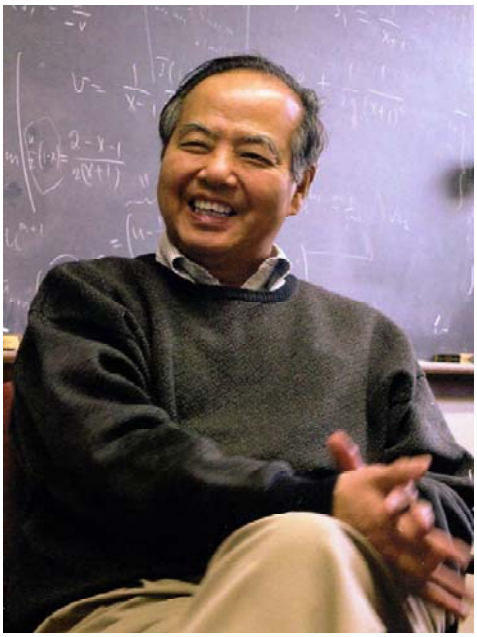
"for deepening Einstein's geometrical approach to physics in the best tradition of Paul Dirac and Hermann Weyl".

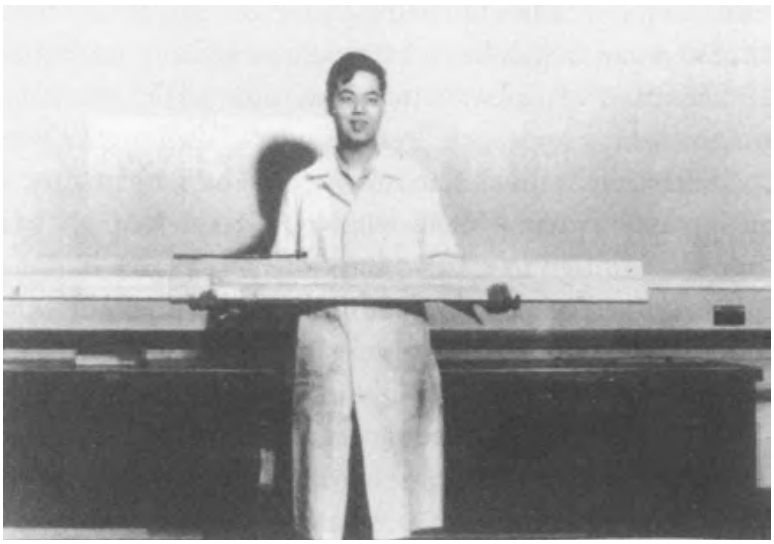
"… I would like to discuss some influence Fermi had in China: this is the case in which two of Fermi's Chinese students and collaborators had an unprecedented impact on science at the international level and triggered the scientific development of the largest nation in the world: China. During my second visit to China in 1979 I went to Kun Ming: it was quite an experience to see this beautiful location on the border of a lake so vividly described by Marco Polo. There was a train line constructed by the French reaching this town from Hanoi. There was also a beautiful university where two young students studied physics during World War II, there the professors from the Bei DA and Qing Hua university of Beijing and their families having escaped from the east of China ahead of the Japanese invasion. Their names were Chen Ning Yang and Tsung Dao Lee. At the end of the war they transferred to the USA: Frank C.N. Yang became Fermi's assistant and T.D. Lee was followed in his Ph.D. thesis by Fermi. The remarkable scientific career of these two young Chinese scientists is well recorded in the history of science. After Nixon's visit to China in 1972, Yang and Lee frequently went back to China to deliver lectures based on the Fermi tradition and today they are spending the greater part of their time in China organizing scientificcenters and activities. In 1979 Yang gave a lecture at the second MG meeting in Trieste (see figure on the right: C.N. Yang speaking with a thoughtful Pam Dirac listening). During the Third Galileo-Xu Guangqi Meeting in 2011 I had another pleasant meeting with C.N. Yang. This also gave me the opportunity to see Beijing University again, having originally seen it in 1978 after the cultural revolution with all its libraries burned, now renewed and reaching a new splendor. Next to the Zhou Pei-Yuan Institute are the offices of the C.N. Yang Center. We talked about our common friend Isidor Rabi and his role in collaborating with Eisenhower as President of Columbia University prior to the latter's election as President of the USA. We also talked about Fermi's role in formulating his theory of beta decay, of the adventures of the A-bomb and H-bomb projects and many other topics. This also gave me the chance to introduce him to our ongoing projects with ICRANet in Brazil."

From "Einstein, Fermi, Heisenberg and Relativistic Astrophysics: Personal Reflections by Remo Ruffini" World Scientific Singapore 2015.

T.D. LEE

"*for his work on white dwarfs motivating Enrico Fermi's return to astrophysics and guiding the basic understanding of neutron star matter and fields*"





"... Returning to the main topic of Fermi and astrophysics, it is interesting that according to T.D. Lee Fermi's original critical attitude expressed in his Trento lecture on the interior of stars was evolving towards the end of his life. As recalled by T.D. Lee in a talk held at a joint meeting of the APS and AAPT in February, 2010 "Remembering Enrico Fermi," Fermi was beginning to warm up towards astrophysics in his final years: Fermi asked Lee during his Ph.D. thesis the approximate temperature of the Sun at its center. Lee replied, "Ten million degrees." Fermi asked: "How do you know?" Lee told him he had looked it up. Fermi asked if he'd verified the number and Lee replied, "It's really complicated. It's not so easy to integrate these equations." Fermi suggested that Lee build a huge specialized slide rule that would enable the solution of two radiative transfer equations, one that involved the 18th power of the temperature, and the other that involved the reciprocal of temperature to the 6.5th power. Over the next few weeks Lee built a slide rule that was 6.7 feet long and carried out the necessary integration. 'It was great fun'... In the imperial Chinese tradition of the past, in each town in China there was a palace in which every year the best young astronomers were examined and selected and brought to the imperial palace to perform their study and research. Great credit goes to T.D. Lee for having reactivated this selection process on a large scale and having sent the most qualified young students not to the imperial palace in Beijing but to the leading universities in the USA for many years a similar program has been activated in Tokyo. These experiences, as well as our more limited effort with ICRA and ICRANet, have beensignificant components in guaranteeing that most impressive scientific, technological and industrial development that the entire world admires today in China. In some sense this authentic scientific and cultural evolution of modern China was triggered directly and indirectly by the influence of Fermi."

From "Einstein, Fermi, Heisenberg and Relativistic Astrophysics: Personal Reflections by Remo Ruffini" World Scientific Singapore 2015.

In this ceremony of Marcel Grassmann award, prof. C.N. Yang delivered an enlighten speech personally recalling prof. E. Fermi and his physics revolutionally impacting on human being life.

In this year 2017, we have finalized the organization of the Fifth Galileo-Xu Guangqi Meeting (GX5) held in 25-30 June 2017 in Chengdu, Emei mountain, Sichuan, China in conjunction with the 2017 Annual meeting of the Division of Gravitation and Relativistic Astrophysics of the Chinese Physical Society. In this Fifth GX5, in addition to presentations and discussions of scientific developments of Relativistic Astrophysics and related fields, we have presented the recent work of the reaching of the understanding of Gamma Ray Bursts (GRBs) afterglow phenomenon in the 20th anniversary of their discovery by Italian-Dutch satellite, BeppoSax in 1997. As in previous GX meetings, ongoing and preliminarily planned Chinese research projects and proposals with international co-operations have been arranged for presentations and discussions. These include the current collaboration between the research group of Astrophysics in Italian Ferrara University, prof. Filippo Frontera, and Chinese Institute of High Energy Physics (IHEP), CAS (High Energy Physics, Chinese Academy of Science), prof. Li Tipei and Zhuang Shuannan concerning the Hard X—ray Modulation Telescope (HXMT) mission by China's first astronomical satellite, as well as world-wide leading underground experimental projects for dark matter studies, PandaX in Sichuan China and Gran Sasso Laboratory in Abruzzo, Italy.

中国物理学会
Chinese Physical Society

International Center for Relativistic Astrophysics Network

Group photo of the participants to the 2017 Annual meeting of the Division of Gravitation and Relativistic Astrophysics of the Chinese Physical Society / The Fifth Galileo-Xu Guangqai Meeting, June 25 -30, 2017, Chengdu – China.

This meeting represents a CAS-TWAS-ICRA-ICRANet's collaboration with University of Roma "Sapienza", University of Nice "Sophia Antipolis", Stockholm University, Free University of Berlin, University of Bremen, ICRA, ENEA, INFN, ICTP, TWAS , Observatoire de la Côte d'Azur, CBPF, the Tartu Observatory, the Vatican Observatory, together with Chinese Academy Science institutions including: the Shanghai Astrophysical Observatory, the Institutes of High Energy Physics, the Institute of Theoretical Physics, the University of Science and Technology of China, as well as other Chinese leading universities among them: Shanghai Jiao-Tong University, Southwest Jiaotong University, the Beijing Normal University.

Prof. Ruffini during his talk at the 2017 Annual meeting of the Division of Gravitation and Relativistic Astrophysics of the Chinese Physical Society / The Fifth Galileo-Xu Guangqai Meeting, June 25 -30, 2017, Chengdu – China.

In this joint meeting, there were more than 450 participants coming worldwide, in particular Asia area, including many young Chinese researchers and Ph.D. students from all over China. The researchers and Ph.D. students of ICRANet institutions have actively participated the meeting. The joint organizing committee organized four day intensive scientific program of plenary and parallel sessions for about 120 speakers, and one day free discussion among participants while they were together or visiting the Chengdu area which has most rich cultural heritage and long history in China. The joint meeting program covered a broad topics, including but not limited to the theory of gravitation, gravitational wave physics, black hole physics, quantum gravity, gravitational experiments, curved space quantum field theory, relativistic astrophysics, dark matter and dark energy, and cosmology. The meeting was scientifically very successful and discussions and idea exchange were fruitful. Young students and researchers have made their important presentations to the meeting and particular awards were delivered to excellent presentations.

In addition, Prof. Ruffini presented a public lecture in Southwest Jiaotong University, undergraduate students were interested very much and raised many stimulating question and discussions. The fifth Galileo-Xu Guangqi meeting follows the first, second, the third and fourth meetings of this series held on October 2009 in Shanghai – China (http://www.icranet.org/galileo-xuguangqi), on July 2010 in Ventimiglia - Italy and Nice – France (http://www.icranet.org/2nd_galileo-xuguangqi), on October 2011 in Beijing (http://www.icranet.org/3gx) and on May 2015 always in Beijing (http://www.icranet.org/4gx) – China. The meeting's program is available here: http://gra2017.csp.escience.cn/dct/page/70010 At this link the photos of the meeting: http://www.icranet.org/index.php?option=com_content&task=view&id=1130 At this link the video of the public lecture of Professor Ruffini:

http://www.icranet.org/index.php?option=com_content&task=view&id=1120

The "China-Italy Science, Technology & Innovation Week", Beijing, China, 13-17 November 2017

From the 13th to 17th of November the "China-Italy Science, Technology & Innovation Week" 2017 Edition has been held in three different cities across China: Beijing, Chengdu and Guiyang, see: http://www.cittadellascienza.it/cina/

The meeting "China-Italy Science, Technology & Innovation Week" in Beijing. From right to left: prof. Remo Ruffini, Director of ICRANet, the Chinese Minister of Science and Technology, Wan Gang, Italian Minister of Education, University and Research, Valeria Fedeli. Fifth from right: Prof. Wen Biao Han, from the Shanghai Astronomical Observatory.

The initiative, dedicated to the science and technology cooperation activities between the two countries with the aim of creating scientific, technological and commercial partnerships in the innovative research-entrepreneurial system, is promoted by the Ministry of Science and Technology of China and from the Italian side by the Ministry of Education, University and Research – MIUR in cooperation with the Ministry of Foreign Affairs and International Cooperation – MAECI and it is coordinated by Città della Scienza of Naples. It is realized in synergy with the Ministry of Economic Development, the Ministry of Health and the Ministry of Environment and Land and Sea Protection and in cooperation with the National Research Council, Confindustria (the Italian association of Italian entrepreneurs) and the main Italian Universities and Research Centers, together with the Campania Region for the Sino-Italian Exchange Event.

The signature of collaboration agreements by Chinese and Italian partners. Standing: the Chinese Minister of Science and Technology, Wan Gang and Italian Minister of Education, University and Research, Valeria Fedeli. Third and forth from left: prof. Remo Ruffini from ICRANet, and Prof. Wen Biao Han, from the Shanghai Astronomical Observatory.

Professor Remo Ruffini, Director of ICRANet, has participated at the opening institutional ceremony of the event, launched in Beijing on November 14th in presence of the Italian Minister of Education, University and Research, Valeria Fedeli, and the Chinese Minister of Science and Technology, Wan Gang. In this occasion, Prof. Ruffini and Prof. Wen Biao Han, from the Shanghai Astronomical Observatory (SHAO) signed the "Agreement on joint Chinese-Italian activities in the field of relativistic astrophysics".

Agreement on joint Chinese-Italian activities in the field of relativistic astrophysics

Agreement on joint Chinese-Italian activities in the field of relativistic astrophysics

On the occasion of the solemn ceremony of the joint meeting "CHINA-ITALY SCIENCE, TECHNOLOGY & INNOVATION WEEK" (13-15 November 2017, Beijing), in the presence of the Italian Minister of Education, Universities and Research (MIUR), Valeria Fedeli, and of the Chinese Minister of Science and Technology, Wan Gang,

the following institutions in China and Italy agree to collaborate on joint activities in the period 2018 - 2019, including seminars and workshops.

In particular:

1. the Fifteenth Marcel Grossman Meeting to be held in Rome from 1 to 7 July 2018 MGXV (http://www.icra.it/mg/mg15/),

2. the Sixth Galileo-Xu Guangqi Meeting - GX6 (http://www.icranet.org/GXMeetings) to be held in Italy: in Pescara and Rome at ICRA/ICRANet, in Naples at the University "L'Orientale", and in Matera at the "Centro di Geodesia Spaziale Giuseppe Colombo" in 2019,

3. ASI, ICRA/ICRANet, INFN researchers will visit Chinese Institutions and, analogously, Chinese researchers will visit ASI, ICRA/ICRANet, INFN.

The research topics, in the field of Relativistic Astrophysics, to be covered by these joint activities, include: Gamma-Ray Bursts, Gravitational waves, Neutron Stars, Active Galactic Nuclei, Quasars, Neutrino astrophysics, Black Hole physics and astrophysics, Dark Matter, Quantum Gravity and Curved Space Quantum Field Theory as well as Nuclear Astrophysics.

The Chinese Institution:

Shanghai Astronomical Observatory (SHAO)
Chinese Academy of Science (CAS)
(e-mail: wbhan@shao.ac.cn)

The Italian Institutions are:

ASI (e-mail: presidenza@asi.it)
ASI – Centro Geodesia Spaziale G. Colombo Matera (e-mail: giuseppe.bianco@asi.it)
ICRA/ICRANet
(e-mail: ruffini@icra.it; secretariat@icranet.org)
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University of Rome "Sapienza"
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e-mail: wbhan@shao.ac.cn

Italian Representative signature in Beijing

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e-mail: ruffini@icra.it

ICRANet

In this agreement SHAO, ASI, ASI – Centro Geodesia Spaziale G. Colombo Matera, ICRA/ICRANet, INFN, University Campus Biomedico in Rome, University "l'Orientale" in Naples, University of Rome "Sapienza, agree to collaborate on joint activities in the period 2018 - 2019, including seminars and workshops such as: the Fifteenth Marcel Grossman Meeting to be held in Rome from 1 to 7 July 2018 MGXV (http://www.icra.it/mg/mg15), the Sixth Galileo-Xu Guangqi Meeting - GX6 (http://www.icranet.org/GXMeetings) to be held in Pescara and Rome (Italy) at ICRA/ICRANet, in Naples at the University "L'Orientale", and in Matera at the "Centro di Geodesia Spaziale Giuseppe Colombo" in 2019. In addition, it was agreed that ASI, ICRA/ICRANet, INFN researchers will visit Chinese Institutions and, analogously, Chinese researchers will visit ASI, ICRA/ICRANet, INFN. The research topics, in

the field of Relativistic Astrophysics, to be covered by these joint activities, include: Gamma-Ray Bursts, Gravitational waves, Neutron Stars, Active Galactic Nuclei, Quasars, Neutrino astrophysics, Black Hole physics and astrophysics, Dark Matter, Quantum Gravity and Curved Space Quantum Field Theory as well as Nuclear Astrophysics.

For the text of the Agreement, see: http://www.icranet.org/documents/Chinese-Italian_activities.pdf

In addition to these regular meetings, a collaboration agreement between ICRANet and IHEP, CAS is already operative. Relevant is also the fundamental roles of profs. Remo Ruffini and Shuang Nan Zhang in directing their activities.
On the 4th of November 2016, the agreement between ICRANet and the IHEP, CAS has been renewed. This new agreement was signed by Prof. Shuangnan Zhang, Director of Center for Particle Astrophysics and Prof. Ruffini, Director of ICRANet. This agreement will be valid for other five years and the joint activities will consist in:

- promotion of theoretical and observational research activities within the field of Relativistic Astrophysics;
- the institutional exchange of faculty members, researchers, post- doctoral fellows and students;
- promotion of technological developments between IHEP and ICRANet;
- development of Data Centers for astrophysical data in all wavebands;
- the organization of training and teaching courses;
- the organization of seminars, conferences, workshops or short courses;
- joint publications

ICRANet coordinating center in Pescara, Italy (left) and IHEP, CAS in Beijing (right). The text of the agreement can be found here, see also Enclosure 5.

On July 15 2015, the similar agreement, the Memorandum of Understanding (MOU) between ICRANet and Leung Center for Cosmology and Particle Astrophysics (LeCoSpa), National Taiwan University, was renewed for other five years. Signature was made by the director of ICRANet prof Remo Ruffini and director of LeCoSpa prof Pisin Chen in Besso Foundation in Rome, Italy.

The text of the agreement can be found here, see also Enclosure 5.

On November 7, 2016, Professor Remo Ruffini gave a seminar entitled “Supernovae, Hypernovae and Binary Driven Hypernovae” at Shanghai Jiao Tong University, where the father of the Chinese rocket industry Hsue-Shen Tsien graduated from and now professor T.D. Lee has established a research Institute. The organizer of this event was the youngest member of the Chinese Academy of Sciences, Professor Jing Yipeng, director of the new formed center of Astronomy & Astrophysics (CAA), professor in the Department of Physics at this university and a former PhD student of Professor Ruffini. In this occasion Professor Ruffini and Professor Jing Yipeng discussed the cooperation between ICRANet and CAA including the 5th Galileo-Xu Guangqi Meeting (GX V) in June 2017. The collaboration agreement between ICRANet and CAA of Shanghai Jiao Tong University was discussed and currently proceeded by Professors Remo Ruffini and Jing Yi Peng.

All these will open the way to the entrance of China into ICRANet as a member state.

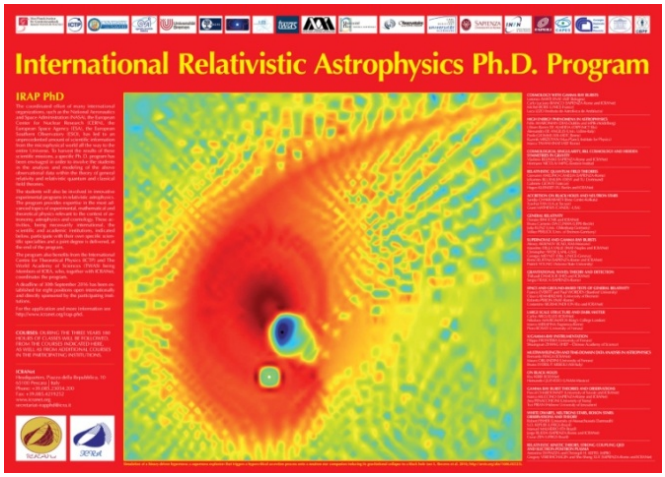


Indeed China today is one of the countries with the highest education levels and consequently with many far-reaching advances in observations of the universe from space, from Earth and from underground laboratories. These developments in which China is engaged as well as their laboratories, radio telescopes and space missions are all very much appreciated by the international scientific community. In order to promote this great tradition and its success in the development of an international school of relativistic astrophysics, ICRANet is leading an international coordination to create an astrophysical data center and engage students and professors in this endeavor through the IRAP PhD doctorate. Brazil, Russia, India, China and South Africa are joining this effort with Italy.

Chinese scientists of the next mission on the Moon, visited the ICRANet center in Pescara

After 40 years since the last mission of Soviet Union “Luna 24”, Chinese space mission “Chang'e 5” will come back on the Moon, with the goal to pick up and study samples of rocks. The mission is planned for November 2017.
On 2 of May 2017 20 Chinese scientists, a team, led by prof. Xie Gengxin, that work for the Chinese space mission “Chang'e 5”, visited the ICRANet headquarters in Pescara, together with Professor Paolo Giommi from ASI. They have met professors and researchers of ICRANet, and attended the presentation of Professor Ruffini, Director of ICRANet.

As recalled, ICRANet has established the joint international PhD program (IRAP) and the Shanghai Observatory of Chinese Academy of Science (CAS) has been already one of the members of the IRAP PhD consortium



This PhD program has involved Chinese students, Wang Yu, Li Liang, Wu Yuanbin, Yang Xiao Feng and Chang Yi Liang, Yen-Chen Chen, Han Wenbiao, see here and also Enclosure 7. We list some of very recent publications participated by Chinese researchers and students :

R. Ruffini, G. V. Vereshchagin, and S.-S. Xue, ``Electron–positron pairs in physics and astrophysics: From heavy nuclei to black holes" Phys. Rep. 487, 1 (2010).

W.-B. Han, R. Ruffini, and S.-S. Xue, ``Electron and positron pair production in gravitational collapse", Phys. Rev. D86 (2012) 084004.

R. Ruffini, Y.-B. Wu and S.-S. Xue, ``Einstein-Euler-Heisenberg theory and charged black holes", Physics Review D88, 085004 (2013).

A. Rueda, R. Ruffini, Y.-B. Wu, and S.-S. Xue, ``Surface tension of the core-crust interface of neutron stars with global charge neutrality", Phys. Rev. C89, 035804 (2014).

P. S. Chen and R. Ruffini, Did Gamma Ray Burst Induce Cambrian Explosion?, 2015, Astronomy Reports 59, 469, arXiv: 1403.7303.

R. Ruffini, Y. Wang, et al., Induced Gravitational Collapse in FeCO Core-Neutron Star Binaries and Neutron Star-Neutron Star Binary Mergers, 2015, IJMPA, 30, 28.

R. Ruffini, Y. Wang, et al., GRB 130427A and SN 2013cq: A Multi-wavelength Analysis of An Induced Gravitational Collapse Event, 2015, ApJ, 798, 10, arXiv:1405.7505.

R. Ruffini, M. Muccino, Y. Wang, et al., GRB 090510: A Genuine Short GRB from A Binary Neutron Star Coalescing into A Kerr–Newman Black Hole, 2016, ApJ, 831, 2, arXiv: 1607.02400.

R. Ruffini, M. Muccino, Y. Wang, et al., On The Classification Of GRBs and Their Occurrence Rates, 2016, ApJ 832, 2, arXiv: 1602.02732

G. B. Pisani, R. Ruffini, Y. Wang, et al., On The Universal Late X-ray Emission Of Binary-driven Hypernovae And Its Possible Collimation, 2016, ApJ, 833, 2, arXiv: 1610.05619.

R. Ruffini, M. Muccino, Y. Wang, et. al, GRB 140619B: A Short GRB from A Binary Neutron Star Merger Leading To Black Hole Formation, 2016, ApJ, 808,2, arXiv: 1412.1018

R. Ruffini, J. Rodriguez, Y. Wang, et l., On The Rate and On The Gravitational Wave Emission Of Short And Long GRBs, submitted to ApJ, arXiv: 1602.03545

L. Li, Y. Wang, et al., A Correlated Study Of Optical And X-ray Afterglows Of GRBs, 2015, ApJ, 805,1, arXiv: 1503.00976.

Y. L. Chang, B. Arsioli, P. Giommi, P. Padovani, 2WHSP: A Catalog Of HE And VHE Gamma-ray Blazars And Blazar Candidates, A&A, 598, A17 (2017), arXiv:1609.05808.

R. Ruffini, Y. Wang, et al., Early X-Ray Flares in GRBs, ApJ, 281, 1 (2018), arXiv:1704.03821

Y. Aimuratov, R. Ruffini, et al., GRB 081024B and GRB 140402A: Two Additional Short GRBs from Binary Neutron Star Mergers, ApJ, 844, 1 (2017), arXiv:1704.08179

L. Li, Y. Wang, et al.,A Large Catalogue of Multi-wavelength GRB Afterglows I: Color Evolution And Its Physical Implication, Accepted by ApJS, arXiv:1712.03704

Recently, a framework agreement between Agenzia Spaziale Italiana (ASI, Italian Space Agency) and CAS has been recently signed. An existing collaboration agreement between ASI and ICRANet is consenting, under the guidance of Prof. Paolo Giommi, the implementation of the Brazilian Science Data Center (BSDC), located at ASI, at the ICRANet Center in Pescara, in Rome, at the ICRANet Center at CBPF in Rio de Janeiro and at the University of Rio Grande do Sul in Porto Alegre. The BSDC is being developed as a world-class data center for astrophysics, capitalizing on the experience gathered at the ASI Science Data Center (ASDC) in the data analysis and on the theoretical work developed at ICRANet seats in Pescara, Rome and Yerevan. All ICRANet centers in Armenia, Brazil, France and Italy, as well as all Centers worldwide with signed collaboration agreements with ICRANet will benefit of the BSDC for their research activities.

We are also planning to present a request for financial support to the BRICS for the creation of a BRICS Science Data Center (or BRICS-SDC), coordinated by ICRANet on the topics of Relativistic Astrophysics. BRICS is an association of five major emerging national economies: Brazil, Russia, India, China and South Africa (please see https://en.wikipedia.org/wiki/BRICS). BRICS has recently established its Scientific, Technological and Innovation (STI) Framework Programme (please see: http://brics.rfbr.ru/rffi/eng/brics) with the pilot call in 2016. With the goal to participate in the next 2018 call, we are thinking to present a proposal of a joint activity with Brazilian, Russian, Indian, Chinese and South African Institutions, coordinated by ICRANet as an international organization.

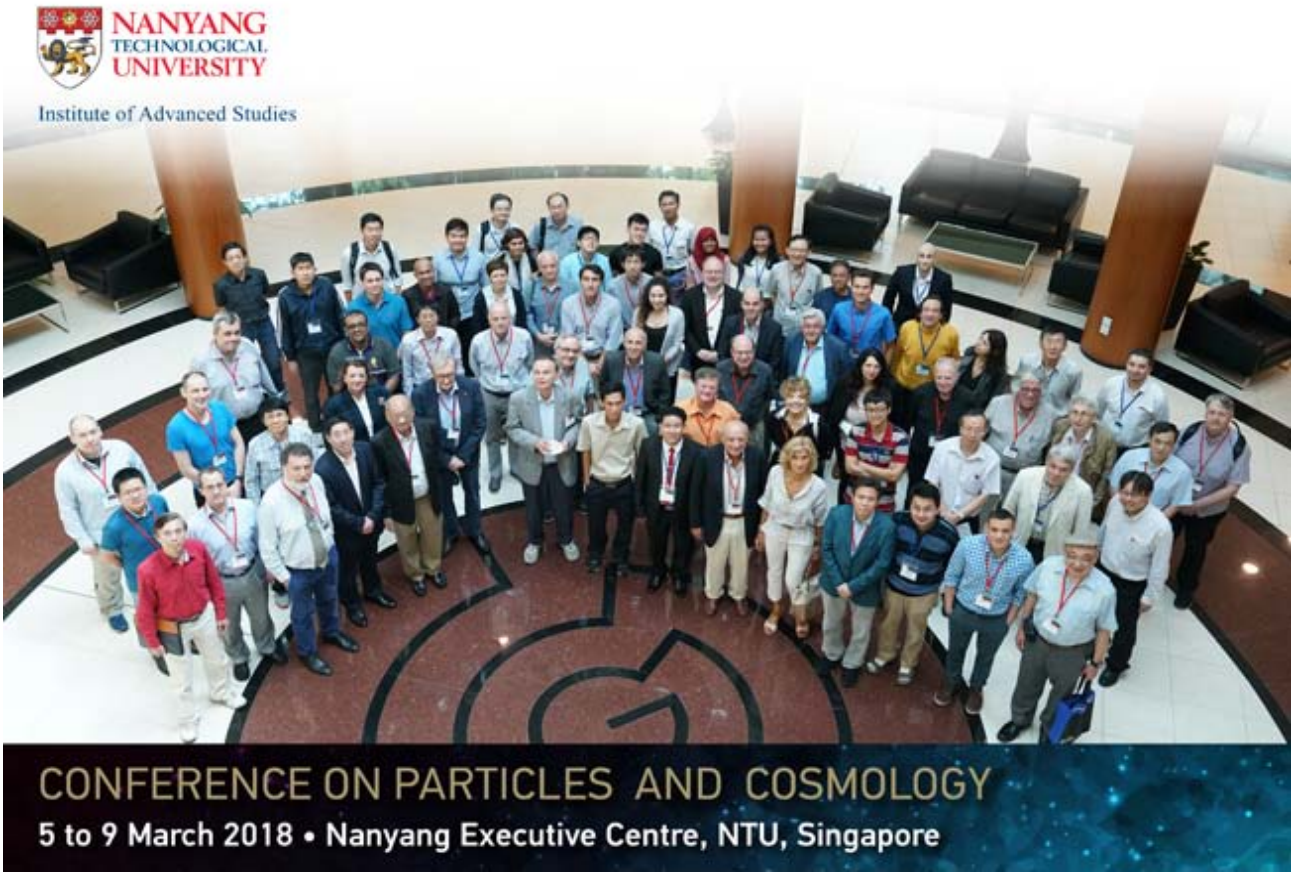
Recently, together with Shanghai Astronomical Observatory (SHAO), CAS, we have made a proposal `` Multi-messenger Astronomy Approach to Dark Matter Physics " for applying the call

https://www.researchitaly.it/innovitalia/news/italia-cina-pubblicato-il-bando-maeci-nsfc-per-la-raccolta-di-progetti-di-ricerca-congiunti/

issued by Italian Ministero degli Affari Esteri e della Cooperazione Internazionale (MEACI) and Chinese National Neutral Science Foundation of China (NSFC) to have some financial supports to the ICRANet activities in both China and Italy, as well as exchange program of researchers and students for three years from 2018-2021.

Today China has been making unprecedented progresses in the development of observational activities from space, from the ground and underground. Everyone worldwide admires these great developments, from Chinese radio telescopes to Chinese underground laboratories and Chinese space missions. The past great success of our almost forty years of collaboration will also bring attention to the possible entrance of China into ICRANet to foster the great tradition and success in developing a school of knowledge in relativistic astrophysics, to participate to a coordinated proposal to BRICS for a common data Center and to promote participation of students and professors in joint IRAP PhD activities.

Professor Ruffini in Singapore for the "*Conference on Particles and Cosmology*", 5 – 9 March 2018, Singapore



On March 4 - 10, 2018, Prof. Ruffini, Director of ICRANet, was invited to visit Singapore and join the "*Conference on Particles and Cosmology*", held at the Nanyang Executive Centre (Nanyang Technological University NTU), from 5 to 9 March.

In the framework of this conference, Professor Ruffini was invited to give an important talk on "*Gamma Ray Bursts in fundamental physics and Cosmology*".

Details about the event can be found here: http://www.icranet.org/singapore2018

Shing-Tung Yau's Marcell Grossman Award 2018

In the last year, ICRANet had many interactions with China in international meetings, including the Marcell Grossmann meeting, held in July 2018 in Rome (Italy). There were many Chinese participants, who presented their works in plenary and parallel sessions, giving impressive impacts on the meeting and the scientific community. This strong interactions found their strongest manifestation through the attribution of the 2018 Marcell Grossmann Award to Chinese Professor Shing-Tung Yau of Harvard University and Tsinghua University:

"*for the proof of the positivity of total mass in the theory of general relativity and perfecting as well the concept of quasi-local mass, for his proof of the Calabi conjecture, for his continuous inspiring role in the study of black holes physics*".

Several publishing companies were present along all the meeting in a space devoted to exhibitions (namely Cambridge University Press, IOP Publishing, Universe and Springer Nature) and also the Chinese state television was present to film and document the event, see:
https://youtu.be/KbTgZuPEGgc and https://youtu.be/cbYbSn2BoFE

Prof. Shing-Tung Yau receving the Marcell Grossmann Award, 2018:

From left to right: Prof. Leo Hollberg, Prof. Rashid Sunyaev, Prof. Shing-Tung Yau, Prof. Remo Ruffini, Rector Eugenio Gaudio, Prof. Roy Kerr, Prof. Lyman Page, Prof Jean-Loup Puget and Prof. Elia Battistelli.

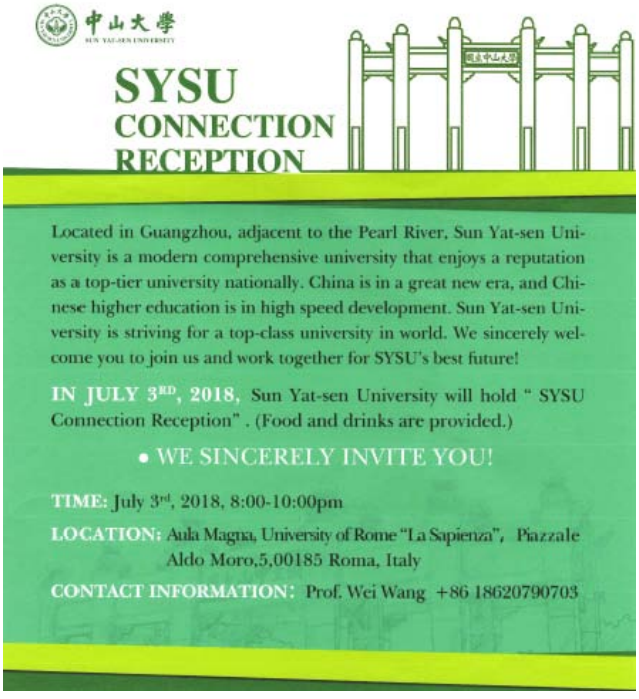
Lower left: Prof. Remo Ruffini reading Shing-Tung Yau MG15 Award motivation.

Lower right: Prof. Roy Patrick Kerr giving the MG15 Award to Prof. Shing-Tung Yau.

Activities organized by the Sun Yat-Sen University (China) during the MG15 meeting July 2018, Rome (Italy)

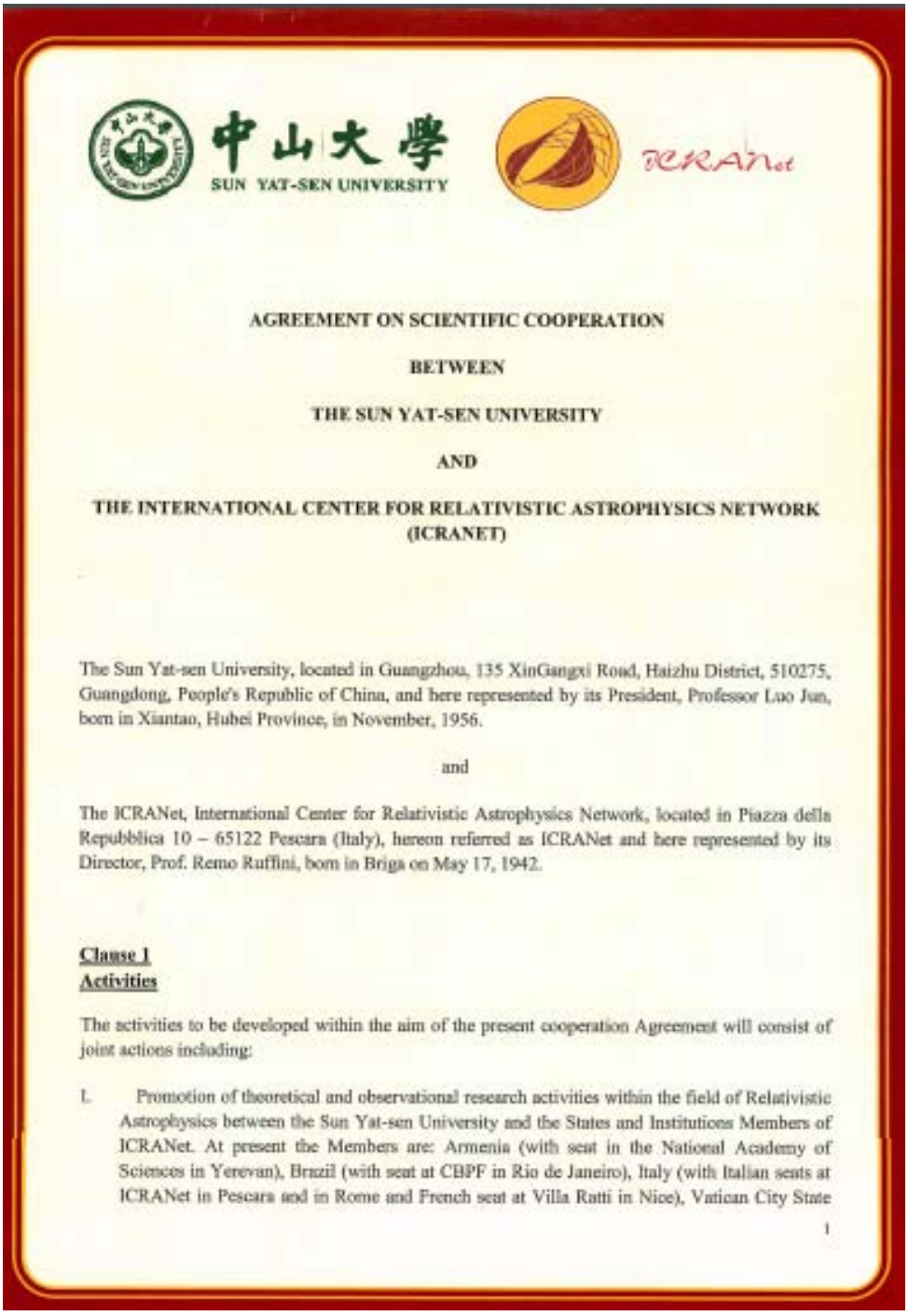
During the MG15 meeting, the President of Sun-Yat Sen University, Professor Luo Jun was invited to present a plenary talk on the Chinese mission Tian Qi, an important project of detecting gravitational wave.

In addition, several social events were organized for all the participants of the meeting to know Chinese projects of scientific research. Eminent Professors and researches from Sun Yat-Sen University (China) presented their Institute and celebrated the signature of the cooperation agreement with ICRANet, by organizing the interesting event "*SYSU Connection reception*".



Collaboration Agreement between Sun Yat-Sen University and ICRANet, Rome, July 4, 2018

On the 4 July 2018, ICRANet signed a cooperation agreement with the Sun Yat-Sen University of Guangzhou – China, which will be valid for 5 years. The document was signed by Prof. Luo Jun, President of the Sun Yat-Sen University, and Prof. Ruffini, Director of ICRANet, during Professor Luo participation as a plenary speaker to the 15th Marcel Grossmann Meeting, held in Rome from 1 to 7 July 2018.



中山大學
SUN YAT-SEN UNIVERSITY

ICRANet

AGREEMENT ON SCIENTIFIC COOPERATION

BETWEEN

THE SUN YAT-SEN UNIVERSITY

AND

THE INTERNATIONAL CENTER FOR RELATIVISTIC ASTROPHYSICS NETWORK (ICRANET)

The Sun Yat-sen University, located in Guangzhou, 135 XinGangxi Road, Haizhu District, 510275, Guangdong, People's Republic of China, and here represented by its President, Professor Luo Jun, born in Xiantao, Hubei Province, in November, 1956.

and

The ICRANet, International Center for Relativistic Astrophysics Network, located in Piazza della Repubblica 10 – 65122 Pescara (Italy), hereon referred as ICRANet and here represented by its Director, Prof. Remo Ruffini, born in Briga on May 17, 1942.

Clause 1
Activities

The activities to be developed within the aim of the present cooperation Agreement will consist of joint actions including:

1. Promotion of theoretical and observational research activities within the field of Relativistic Astrophysics between the Sun Yat-sen University and the States and Institutions Members of ICRANet. At present the Members are: Armenia (with seat in the National Academy of Sciences in Yerevan), Brazil (with seat at CBPF in Rio de Janeiro), Italy (with Italian seats at ICRANet in Pescara and in Rome and French seat at Villa Ratti in Nice), Vatican City State

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For the text of the agreement, see: http://www.icranet.org/sysu

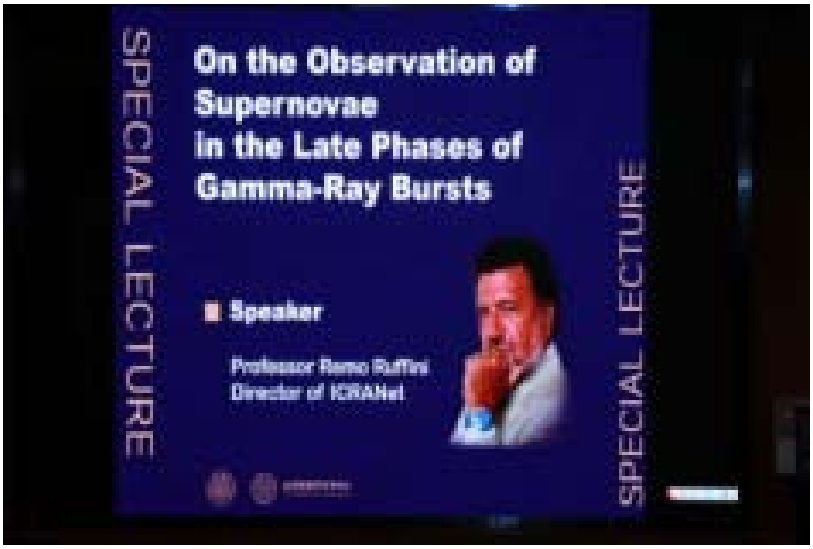
Eminent Professors and researches from this University enjoyed MG15, and took this opportunity to present their Institute and celebrate the signature of the cooperation agreement with ICRANet, by organizing the interesting event "*SYSU Connection reception*" in University of Rome La Sapienza.
The main joint activities to be developed under the framework of this agreement include: the promotion of theoretical and observational activities within the field of Relativistic Astrophysics; the institutional exchange of faculty members, researchers, post-doctorate fellows and students; the promotion of technological developments; the development of Data Centers for Astrophysical data in all wavebands; the organization of training and teaching courses, seminars, conferences, workshops or short courses, and the development of inter-institutional research areas associated to local graduate programs; and joint publications.

Prof. Luo Jun, President of the Sun Yat-Sen University and Prof. Ruffini, Director of ICRANet after the signing the Collaboration Agreement.

For more information about Prof. Luo participation to MG15:
http://www.sysu.edu.cn/2012/en/news/news01/32725.htm

Prof. Ruffini visit to Tsinghua University (Beijing) and TD Lee Institute (Shanghai), August 2018

From 8 to 15 August 2018, Professor Remo Ruffini, Director of ICRANet, visited China, invited by Professor Shing-Tung Yau, to gave a seminar in his Yau Mathematical Sciences Center at Tsinghua University in Beijing on the 9 August 2018. The seminar, titled "*On the observation of supernovae in the late phases of Gamma-Ray Bursts*", illustrated to the public the results otained by Professor Ruffini, ICRANet researchers and PhD students (Y. Aimuratov, L. Becerra, C.L. Bianco, Y.C. Chen, D.M. Fuksman, M. Karlica, G. Mathews, R. Moradi, D. Primorac, J.A. Rueda, N. Sahakyan, Y. Wang, S.-S. Xue).
For the video of the seminar, please see the link:
https://www.youtube.com/watch?v=Q6xssDI7a84&t=805s

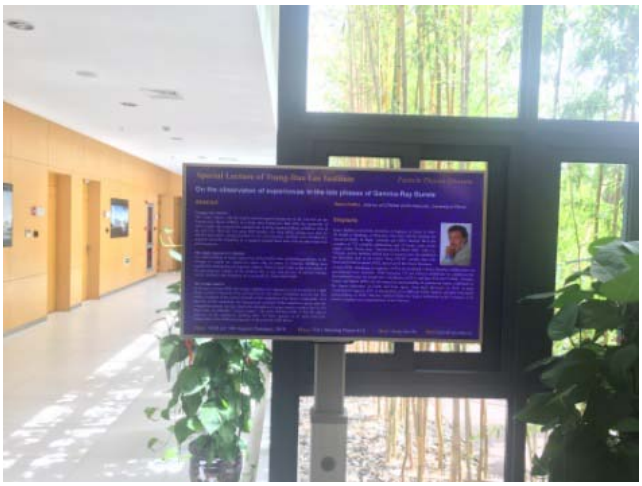


Professor Remo during his seminars at Tsinghua University (Beijing) and at the Tsung-Dao Lee Institute in Shanghai, August 2018.

For more details on the seminar and the prediction of the 2 GCNs:
http://www.icranet.org/documents/Abstract+2GCNs.pdf

Accompanied by Dr Yu Wang, ICRANet PhD student, Professor Ruffini also visited the Tsung-Dao Lee Institute in Shanghai, where he was invited to deliver a C. C. Lin lecture on the same subject presented few days before in Beijing. During his visit in the Institute, Professor Ruffini had also the possibility to see the MG14 Award delivered in 2015 to T. D. Lee "f*or his work on white dwarfs motivating Enrico Fermi's return to astrophysics and guiding the basic understanding of neutron star matter and fields*".

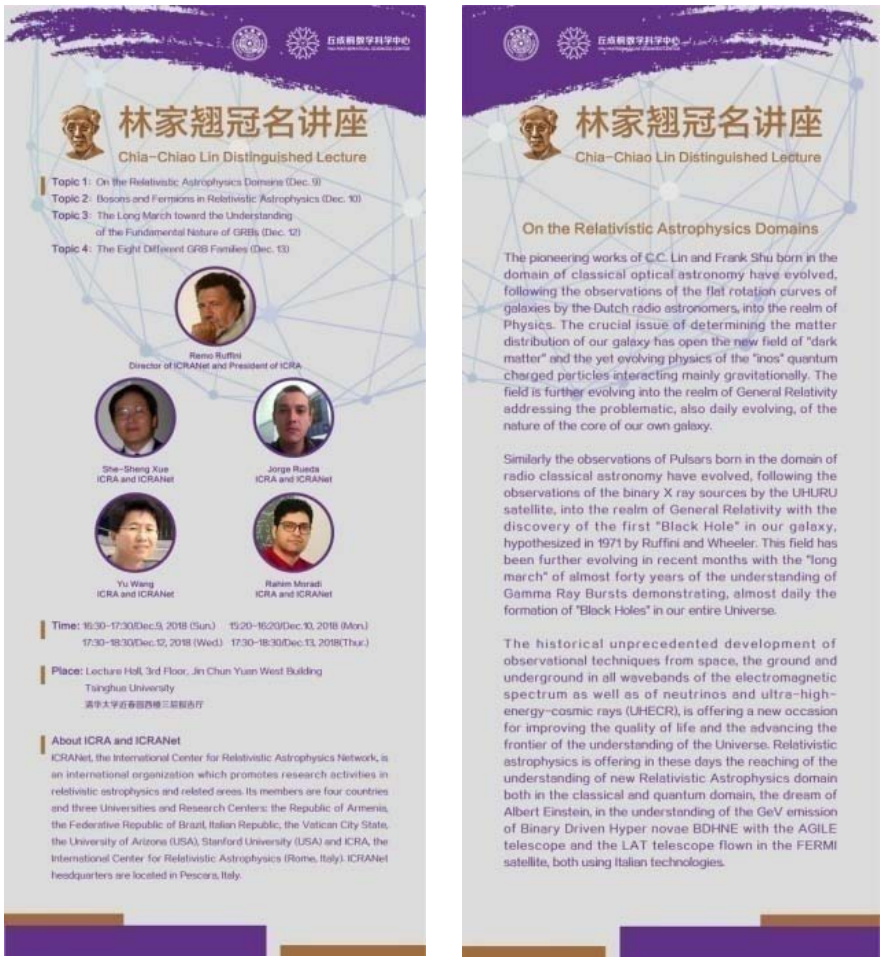
From left to right: Dr. Yu Wang, ICRANet PhD student, Prof. Remo Ruffini, Director of ICRANet, and Prof. Shing-Tung Yau, Director of Yau Mathematical Sciences Center at Tsinghua University in Beijing.



Prof Remo Ruffini, Dr Wang Yu, Chinese Professors and a student in Shanghai, with the MG14 Award delivered in 2015 to T. D. Lee.

Professor Ruffini's distinguished CC Lin Lectures at Tsinghua University (Beijing), December 2018

From 8 to 15 December 2018, Professor Ruffini went to Beijing (China) together with Prof. Jorge Rueda, Prof. Shesheng Xue, Dr Yu Wang and Rahim Moradi. The ICRANet delegation was invited by Professor Shing-Tung Yau, Director of the Yau Mathematical Science Center, to deliver a series of 4 Chia-Chiao Lin Distinguished Lectures at Tsinghua University, one of the most important Chinese institutions.



Announcement of the CC Lin Lectures at Tsinghua University, Beijing.

The first CC Lin Lecture "*On the Relativistic Astrophysics domains*" was presented by Prof. Remo Ruffini (https://youtu.be/hkEOt-kaWZI), the second CC Lin Lecture "*The eight different GRB families*" was presented by Prof. Rueda (https://youtu.be/2dSkvsznL5w), the third CC Lin Lecture "*The long march toward the understanding of the fundamental nature of GRBs*" was presented by Dr. Yu Wang (https://youtu.be/6TT9BiR9o4g) and the forth CC Lin Lecture "*The GeV radiation and the "inner engine" of Gamma Ray Bursts*" was presented by Prof. Xue and Rahim Moradi (https://youtu.be/-UJr6EKq3cY).

During his visit, Professor Ruffini took also part at the 11th Shing-Tung Yau High School Science Award Ceremony, founded in 2008 by Prof. Shing-Tung Yau with the desire to inspire scientific innovations among Chinese high school students all over the world. Professor Ruffini and Professor Xue were invited by Tsinghua University, to deliver some of those awards to the winners.

From left to right: Rahim Moradi, Dr. Wang Yu, Prof. Remo Ruffini, Prof. Shude Mao, Prof. Jorge Rueda and Prof. She-Sheng Xue.

From left to right: Prof. Jorge Rueda, Prof. Remo Ruffini, Prof. Shing-Tung Yau, Prof. She-Sheng Xue and Dr Wang Yu.

Shing-Tung Yau Science Forum and Award Ceremony

Professor Ruffini was also invited to participate to the 2nd S.T. Yau Science Forum. Founded in 2017 by Professor Shing-Tung Yau, the forum aimed at establishing a platform for dialogue between young Chinese students and outstanding scientists and scholars with notable contributions in their respective fields, encouraging students to foster their passion for scientific research, expanding their scientific capacities and visions, and cultivating their innovative mindsets. On that occasion, Professor Ruffini gave an important lecture, titled "*From the earliest visions of the Cosmos to the detection of Black Holes in our Universe*" (video: https://youtu.be/vpICywnsGds).

Mission of Professor Ruffini to China, May 11 - 21, 2019

Nanjing University

From May 11 to 18, 2019, Professor Ruffini visited China, together with Dr Yu Wang and Dr Li Liang. During that visit, they were invited to participate and deliver a talk to the *"Gamma-Ray Bursts and Related Astrophysics in Multi-Messenger Era"*, a conference held in Nanjing University Center from May 13 to 17, 2019. Their presentations of ICRANet research activities, have attracted attention by colleagues from all over the world.

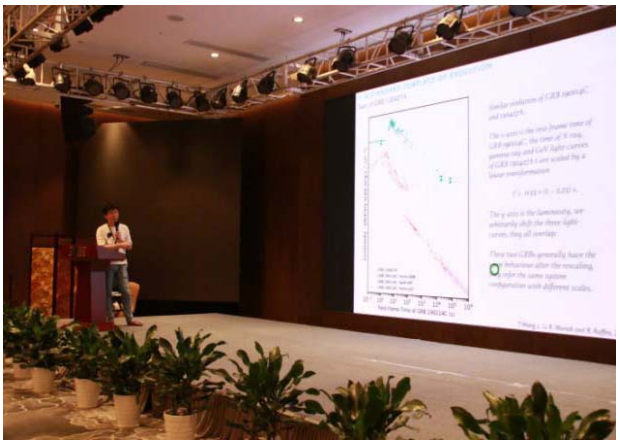
Group photo of the "Gamma-Ray Bursts and Related Astrophysics in Multi-Messenger Era" meeting, Nanjing, May 13-17, 2019.

Prof. Remo Ruffini presenting his talk at the "Gamma-Ray Bursts and Related Astrophysics in Multi-Messenger Era" meeting, Nanjing.

Professor Ruffini delivered a talk titled *"Self-similar structure of the ultra-relativistic prompt emission of GRB 190114C"*, in which he presented a fundamental discovery of new phenomenon in Gamma Ray Bursts.

Dr Wang Yu delivered a talk titled *"GRB 190114C: most comprehensive portrait of gamma-ray burst"* and Dr Liang Li delivered a talk titled *"Shock breakout in BdHN I and BdHN II, the case of GRB 13027A, 180728A and 190114C"*. These researches are the most advanced and timing, closely following the current ongoing observations in Astrophysics.

Dr Liang Li presenting his talk at the "Gamma-Ray Bursts and Related Astrophysics in Multi-Messenger Era" meeting, Nanjing.



Dr Wang Yu presenting his talk at the "Gamma-Ray Bursts and Related Astrophysics in Multi-Messenger Era" meeting, Nanjing.

Tsinghua University and Shanghai Jiaotong Universities

During his visit, Prof. Ruffini also visited some Chinese researchers at Shanghai Jiaotong University and was invited by Professor Shing-Tung Yau, Director of the Yau Mathematical Science Center, to visit Tsinghua University in Beijing, one of the most important Chinese universities. On that occasion, Prof. Ruffini had a fruitful meeting both with Prof. Yau and with Prof. Shude Mao, Director of the Department of Astronomy at Tsinghua University.

University of Science and Technology of China (USTC)

After Shanghai, Prof. Ruffini flew to Hefei in order to meet Prof. Ye-Fei Yuan from the Department of Astronomy of the University of Science and Technology of China (USTC). There, professor Ruffini had discussed with them the future scientific cooperation between ICRANet and China. This keeps in the continuation of tightly cooperation between ICRA and USTC and other Chinese Universities, that Professor Ruffini first visited in 40 years ago.

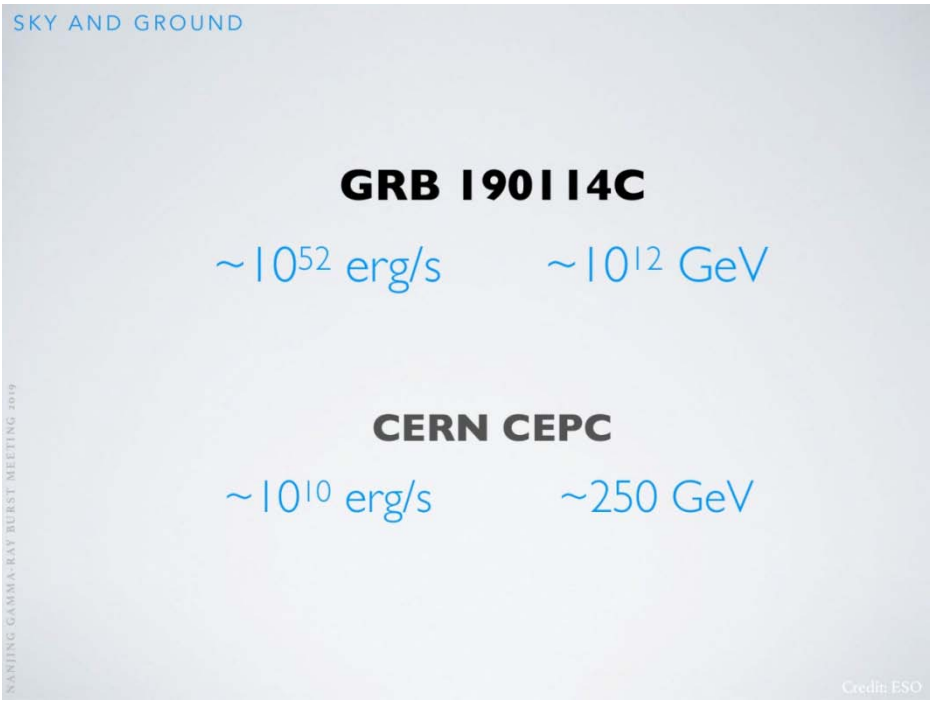
During his visit, Prof. Ruffini had the possibility to present the most recent scientific developments on which ICRANet is working on and to have fruitful exchange of ideas with other researchers from all over the world.

On Friday, May 17 2019, Prof. Remo Ruffini sent an important message from China, on the occasion of the 40° anniversary of his first visit to China:

When I introduced in Princeton the concept of "Black Hole" with John Archibald Wheeler, our omen was to open a new era thanks to the study of Relativistic Astrophysics. Daily phone conversations between me (who was in Princeton) and Riccardo Giacconi (who was in Harvard), tying to interpret data from the satellite UHURU ("freedom" in Swahili, launched by Luigi Broglio from the space station San Marco in Kenya), made this omen a reality. In 1973, I received the Cressy Morrison Award from the New York Academy of Sciences for the discovery of the first "Black Hole" in the galaxy and, in 2002, for those researches, Riccardo Giacconi received the Nobel Prize in Physics.

These progresses have also been marked in 1973 by another event destined to become memorable: the discovery of Gamma Ray Bursts (GRBs). To achieve their understanding/comprehension, it took more than 40 years marked by everyday theoretical studies, accompanied by a "multimessanger" technological and optical development without precedent in the history of humanity. Recently, there have been announcements of a Black Hole at the center of the galaxy, of binary Black Holes, a photo of a Black Hole with enormous multi-media clamor: very interesting if true, using an euphemism by Eugene Wigner.

Thanks to GRB 190114C observed on January 14, 2019, we have identified for the first time, the birth/origin of a "Black Hole", which manifest its existence through the pulsed emission of the biggest energy source in the Universe of MeV, Gev and T_{ev} radiation. A "new" energy source, 10^{30} bigger than the one of the atomic bomb of Los Alamos, with a particle flux 10^{42} and energies 10^{10} bigger than those of CERN and those planned in China at the CEPC, extending to the entire Universe their researches. Fermi led the way: with his research in nuclear physics begun a new age economic, political and military development. Those who will control the science and technology based on this new enormous cosmic energy source, will decide the economic, political and military future of the planet.



First Hangzhou International meeting on gravitational waves and inauguration of the United Center for Gravitational Wave Physics, Hangzhou, China, October 11 - 13, 2019

From October 11 to 13, 2019, Professor Ruffini, Director of ICRANet, visited Hangzhou (China), together with Prof. SheSheng Xue (ICRANet Faculty Professor), since they were invited to deliver a talk on the occasion of the inauguration of the United Center for Gravitational Wave Physics (UCGWP) and of the first Hangzhou International meeting on gravitational waves. Both the events took place in Zhejiang University of Technology (Hangzhou) and were attended by a large number of scientist from all over the world. On that occasion, Prof. Ruffini presented a congratulatory address and plenary lecture titled *"Discovery of energy extraction by discrete "Black-Holic" quanta from a Kerr Black Hole in GRB 190114C"*, while Prof. Xue gave a talk entitled *"Cosmological constant, matter, inflation and cosmic coincidence"*.

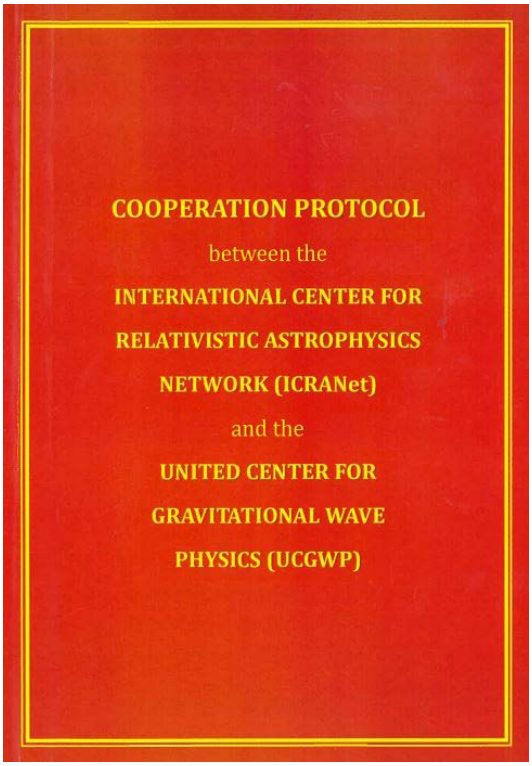
During his visit, Prof. Remo Ruffini had the opportunity to sign the cooperation protocol between ICRANet and UCGWP, the new center located in Zhejiang University of Technology, on October 12, 2019, together with Prof. Anzhong Wang (Director of UCGWP), Prof. Bin Wang (Vice Director of UCGWP) and Prof. Jiliang Jing (Vice Director of UCGWP). They have also taken this occasion to discuss about the possibility of co-organizing the next Galileo-Xu Guangqi meeting (GX6) in this new established center in July 2020, as well as another international conference on gravitational wave physics in 2021.

Group photo of the first Hangzhou International meeting on gravitational waves.

Prof. Remo Ruffini at the inauguration of the United Center for Gravitational Wave Physics (UCGWP).

Prof. Anzhong Wang (Director of UCGWP) and Prof. Remo Ruffini (Director of ICRANet), signing the cooperation protocol between UCGWP and ICRANet.

New cooperation protocol between the United Center for Gravitational Wave Physics and ICRANet, October 12, 2019



On October 12, 2019, a cooperation protocol between ICRANet and the United Center for Gravitational Wave Physics (Hangzhou - China) was signed by Prof. Anzhong Wang (Director of UCGWP), by Prof. Bin Wang (Vice Director of UCGWP), by Prof. Jiliang Jing (Vice Director of UCGWP), by Prof. Remo Ruffini (Director of ICRANet) and by Prof. Jorge Rueda (ICRANet Faculty Professor). The main joint activities to be developed under the framework of this protocol include: the promotion of theoretical and observational activities within the field of Relativistic Astrophysics; the institutional exchange of faculty members, researchers, post-doctorate fellows and students; the promotion of technological developments; the development of Data Centers for Astrophysical data in all wavebands; the organization of training and teaching courses, seminars, conferences, workshops or short courses, and the development of inter-institutional research areas associated to local graduate programs; and joint publications. The agreement has been signed on the occasion of the Inauguration ceremony of the center and of the First Hangzhou International meeting on gravitational waves, both held in Zhejiang University of Technology (Hangzhou, China) from October 11 to 13, 2019. The cooperation protocol will be valid for 5 years.

For the text of the protocol, see: here.

This new established center UCGWP includes four important Chinese Universities: the Shanghai Jiao-Tong University, the Zhejiang University of Technology, the YangZhou University and the Hunan Normal University. They all have opportunities of performing cooperation with ICRANet, through this official agreement signed by ICRANet and UCGWP.

Continue cooperation between the ICRANet and the University of Science and Technology of China (USTC).

From December 12 to 26, 2019, Dr Yunlong Zheng visited ICRANet center in Pescara, as representative from the University of Science and Technology of China (USTC),. ICRANet cooperates very actively with USTC SINCE 1980'S. During his visit, Dr Zheng discussed the future joint cooperation activities between ICRANet and USTC, including the institutional exchange of faculty members, researchers, post-doctorate fellows and students, a joint IRAP Ph.D. program and common research projects. He had also the opportunity to carry on important analysis and research with other ICRANet scientists.

Accompanied by Prof. Ruffini, Dr Zheng visited also the University of Rome La Sapienza, the University Campus Bio-medico of Rome, as well as the University of L'Aquila. His visit was very fruitful and many young researchers and Ph.D. students are expected to come to ICRANet in the forthcoming years.

Prof. Ruffini, Director of ICRANet, together with Dr Yunlong Zheng from USTC, as well as other young ICRANet researchers and students.

Dr Yunlong Zheng (USTC) discussing with Prof. Johann Rafelski, who represented the University of Arizona in Tucson at the 21° ICRANet Steering Committee meeting.