Enclosure 6

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.

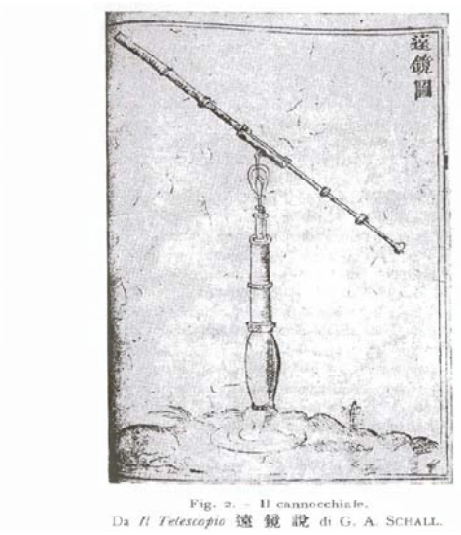
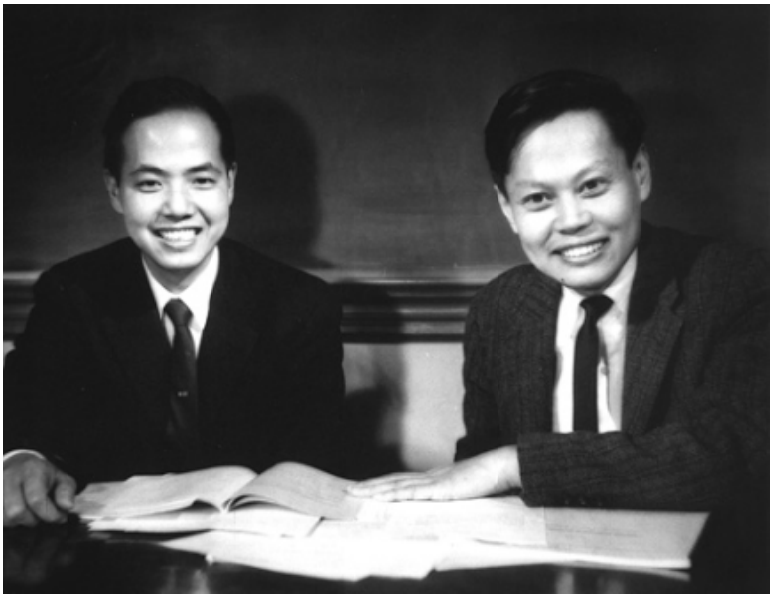


Fig. 2. - Il cannocchiale.
Da *Il Telescopio* 遠 鏡 說 di G. A. SCHALL.

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).

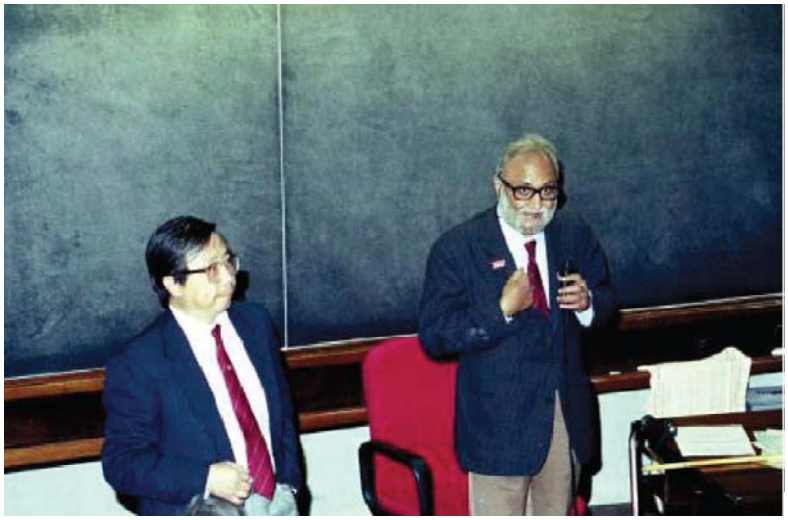
This fundamental and didactical book has been worldwide used by undergraduate and graduate students for many generations.

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.

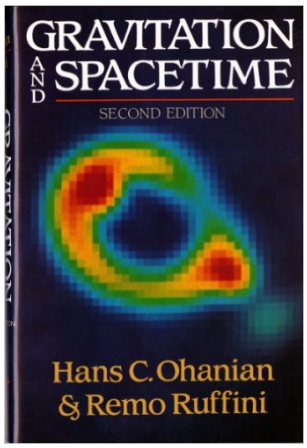
Premier Zhou En Lei and prof. Abdus Salam in 1965

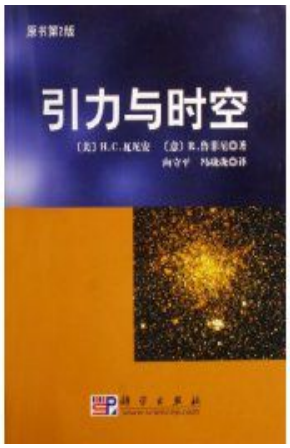
Since then, the collaboration between China and Italy grew exponentially and the attention was turned to foster a collaboration also with the US and to strengthen relations between China and the US, ICTP and the Vatican Observatory. Together in 1985 we created the International Center for Relativistic 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.

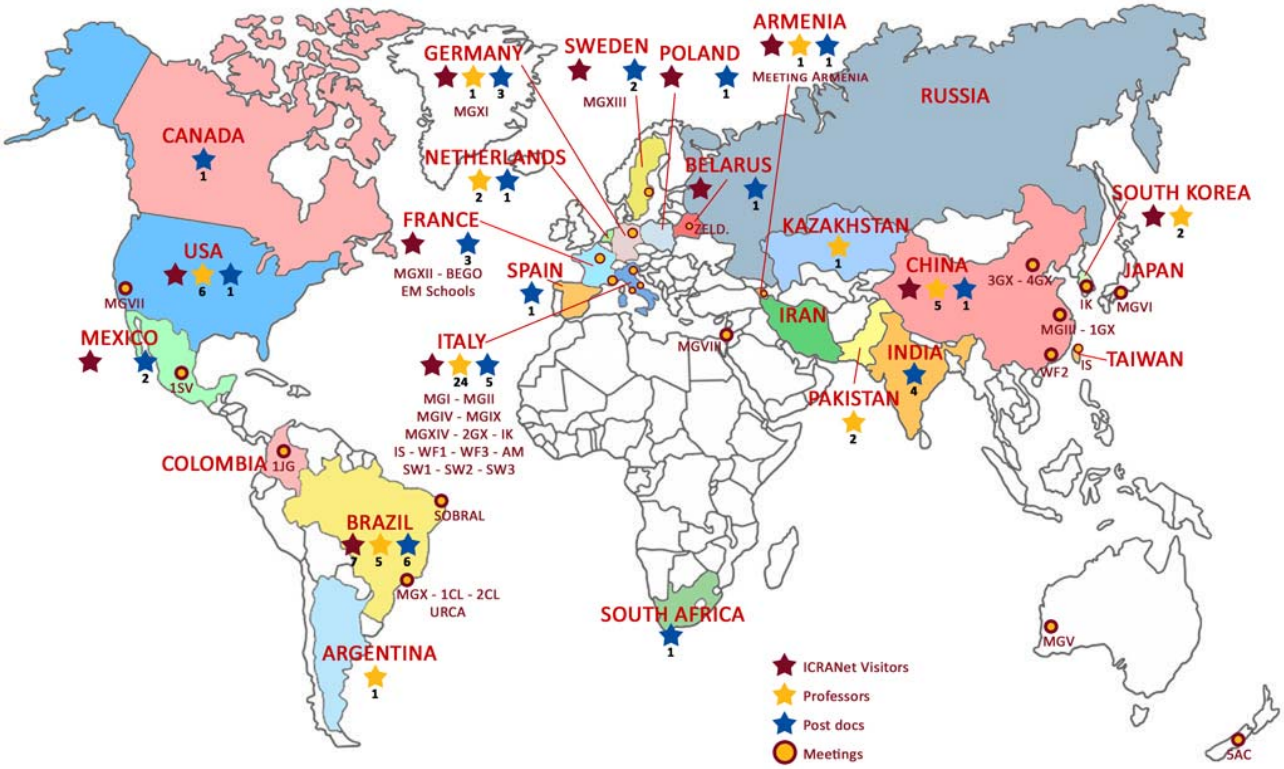




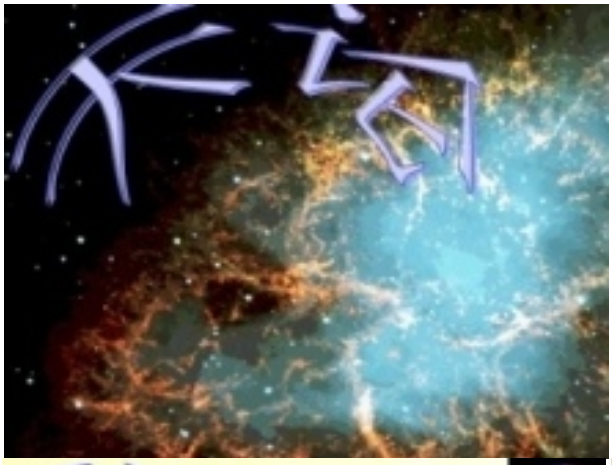
On March 19, 2003, the Establishment and the Statute of ICRANet were signed and recognized in the same year by the Republic of Armenia and the Vatican State. ICRANet has been created in 2005 by a law of the Italian Government, ratified by the Italian Parliament and signed by the President of the Italian 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.

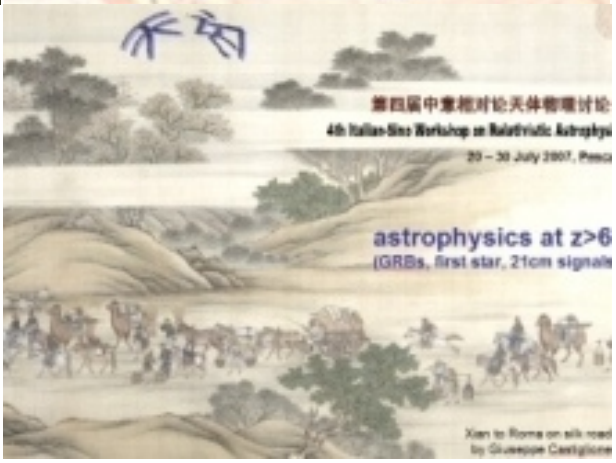
On September 12, 2005 the Steering Committee was established and had its first meeting. Remo Ruffini and Fang Li-Zhi were appointed respectively Director and Chairman of the Steering Committee. On December 19, 2006 the Scientific Committee was established and had its first meeting in Washington DC. prof.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

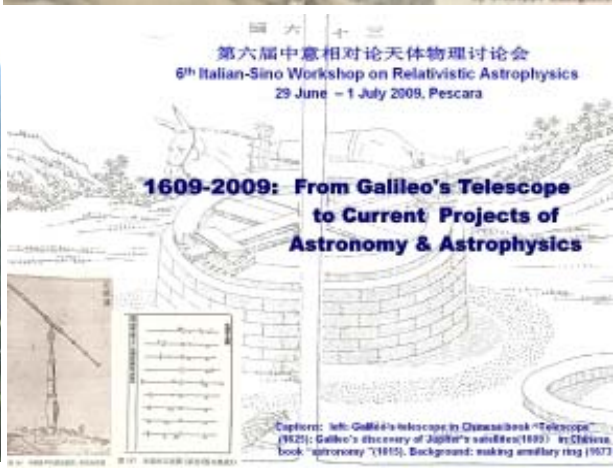
On September 21, 2005 the Director of ICRANet signed with the Ambassador of Brazil Dante Coelho De Lima the adhesion of the Federative Republic of Brazil to ICRANet. The entrance of Brazil, requested by the President of Brazil Luiz Ignácio Lula Da Silva has been unanimously ratified by the Brazilian 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

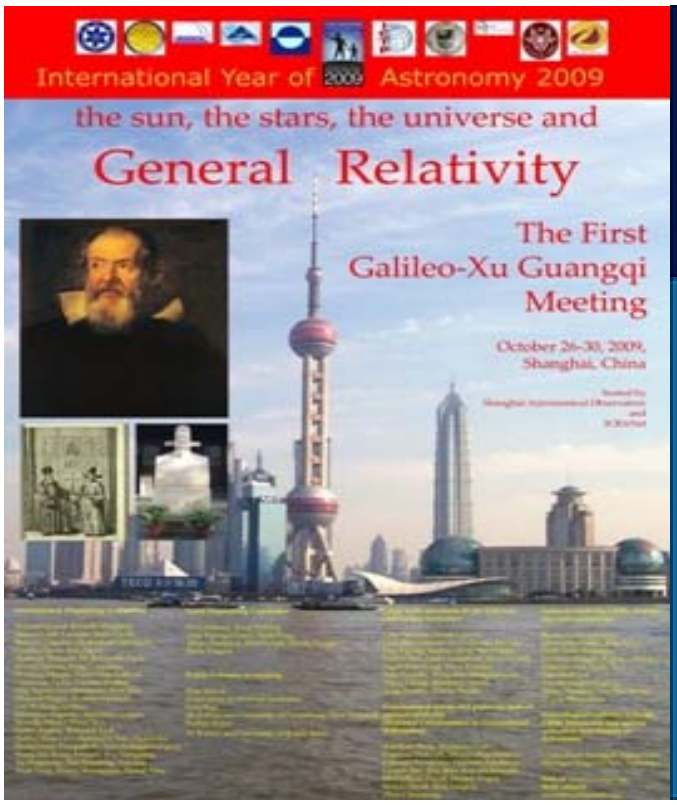


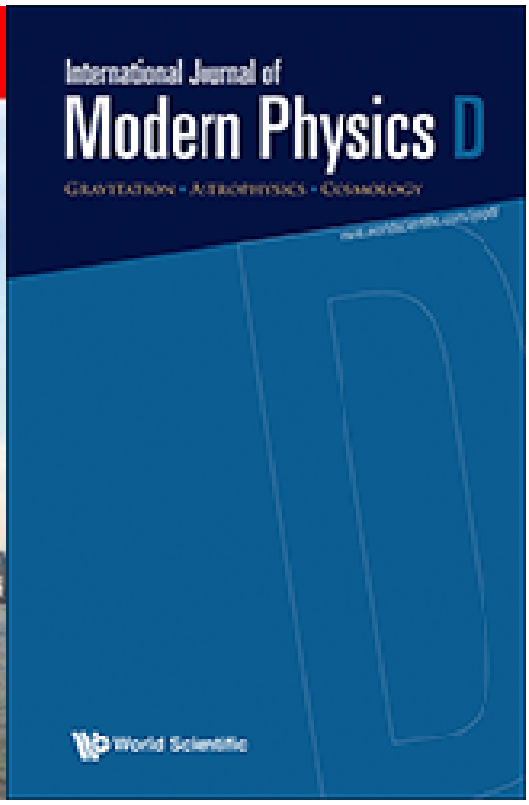




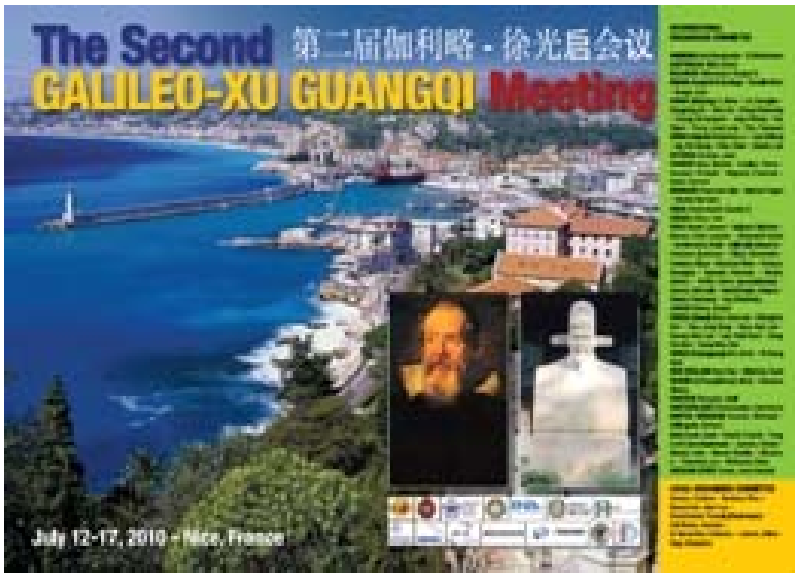
From 2009 to present, a series of joint meetings by ICRANet and Chinese Institutions joint meetings has regularly been established in China, namely, The Galileo Xu Guangqi (GX) meetings http://www.icranet.org/GXMeetings

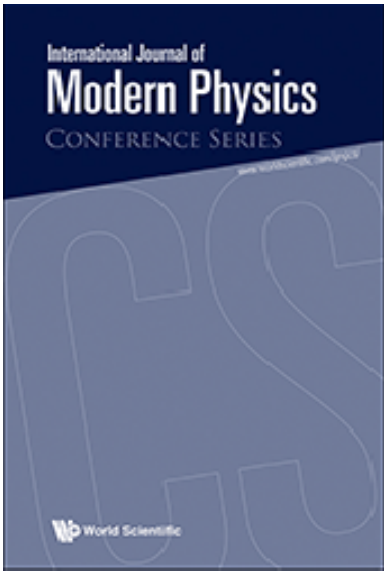
- 1st Galileo-Xu Guangqi Meeting, Shanghai (China), 2009 was organized by the Shanghai Observatory, CAS, Shanghai Jiao Tong University and ICRANet. Proceedings was edited by David Blair, Jing Yi Peng, Remo Ruffini, SheSheng Xue, http://www.worldscientific.com/toc/ijmpd/20/10





- 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

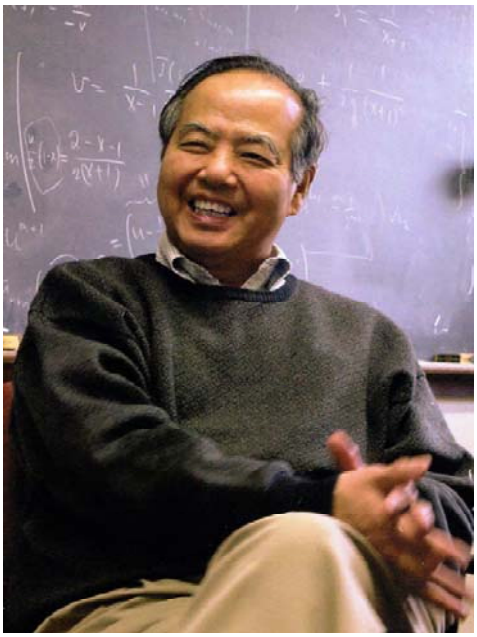
"for deepening Einstein's geometrical approach to physics in the best tradition of Paul Dirac and Hermann Weyl".

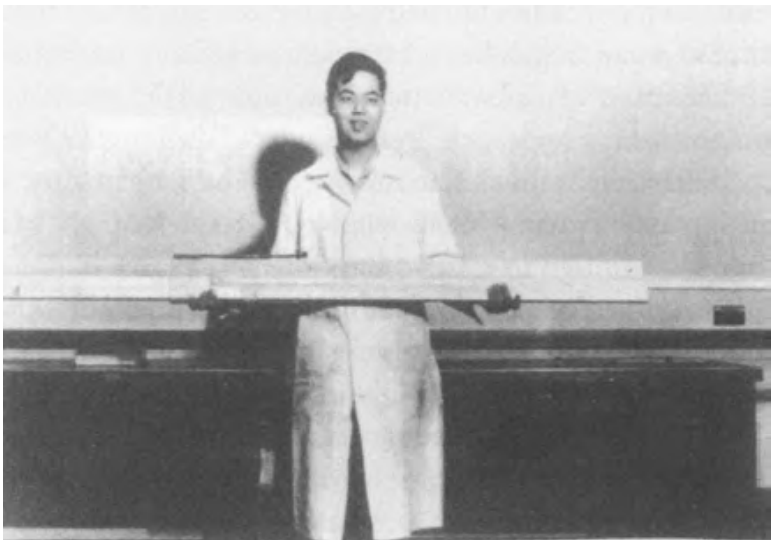
"… I would like to discuss some influence Fermi had in China: this is the case in which two of Fermi's Chinese students and collaborators had an unprecedented impact on science at the international level and triggered the scientific development of the largest nation in the world: China. During my second 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)
INFN (presidenza@presid.infn.it)
University Campus Biomedico in Rome
(e-mail: s.filippi@unicampus.it)
University "l'Orientale" in Naples
(e-mail: rettrice.morlicchio@unior.it)
University of Rome "Sapienza"
(e-mail: rettore@uniroma1.it)

Chinese Representative signature in Beijing

Prof. WenBiao Han
e-mail: wbhan@shao.ac.cn

Italian Representative signature in Beijing

Prof. Remo Ruffini
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.

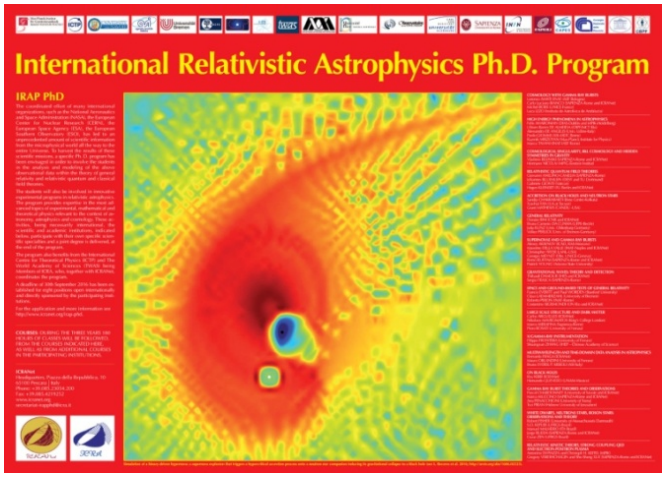


Indeed China today is one of the countries with the highest education levels and consequently with many far-reaching advances in observations of the universe from space, from Earth and from underground laboratories. These developments in which China is engaged as well as their laboratories, radio telescopes 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.

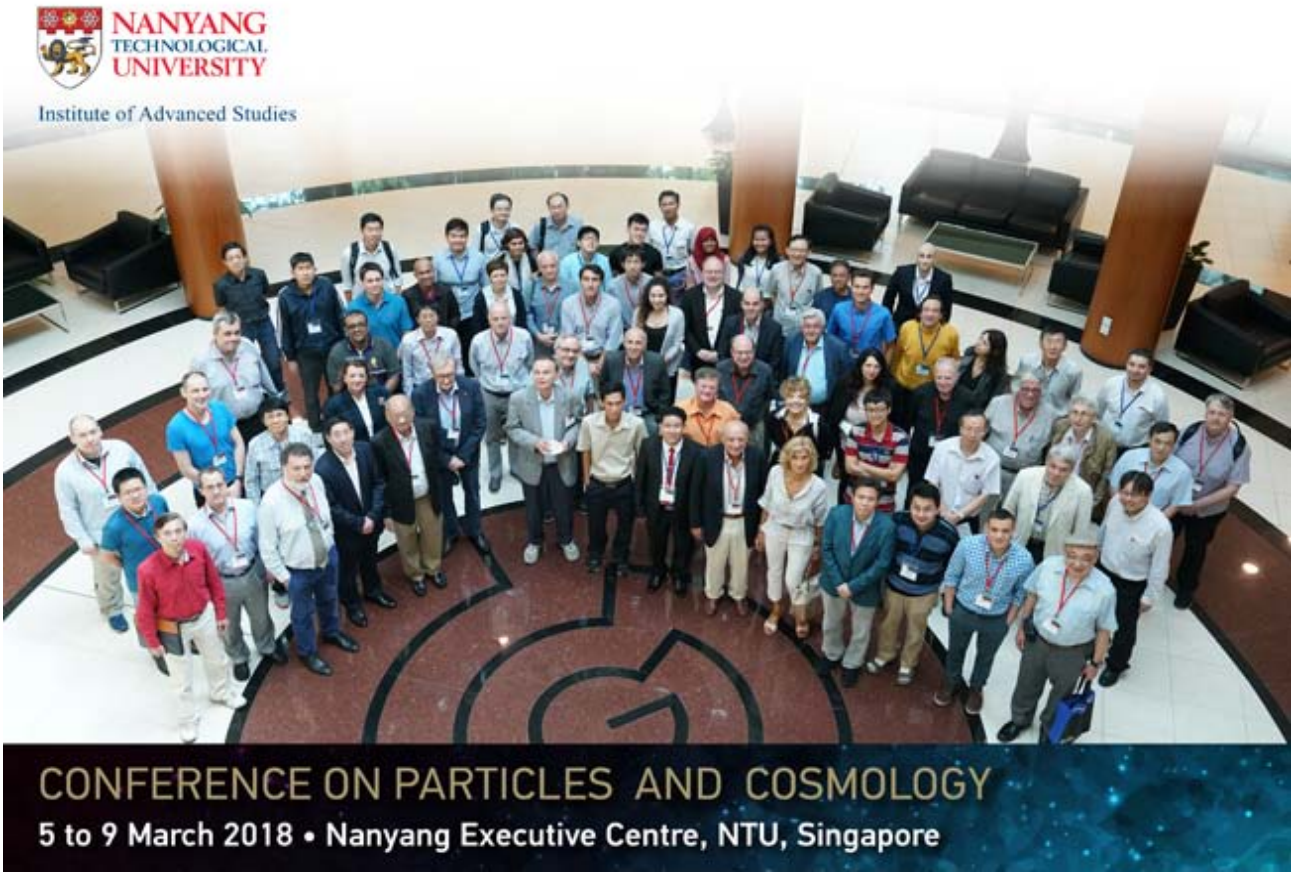
Recently, together with Shanghai Astronomical Observatory (SHAO), CAS, we have made a proposal `` Multi-messenger Astronomy Approach to Dark Matter Physics " for applying the call

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.

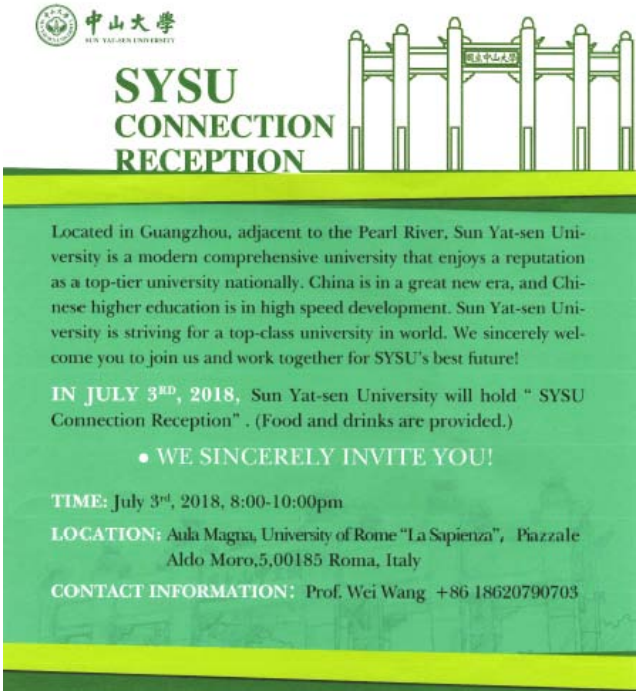
Lower left: Prof. Remo Ruffini reading Shing-Tung Yau MG15 Award motivation.

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)

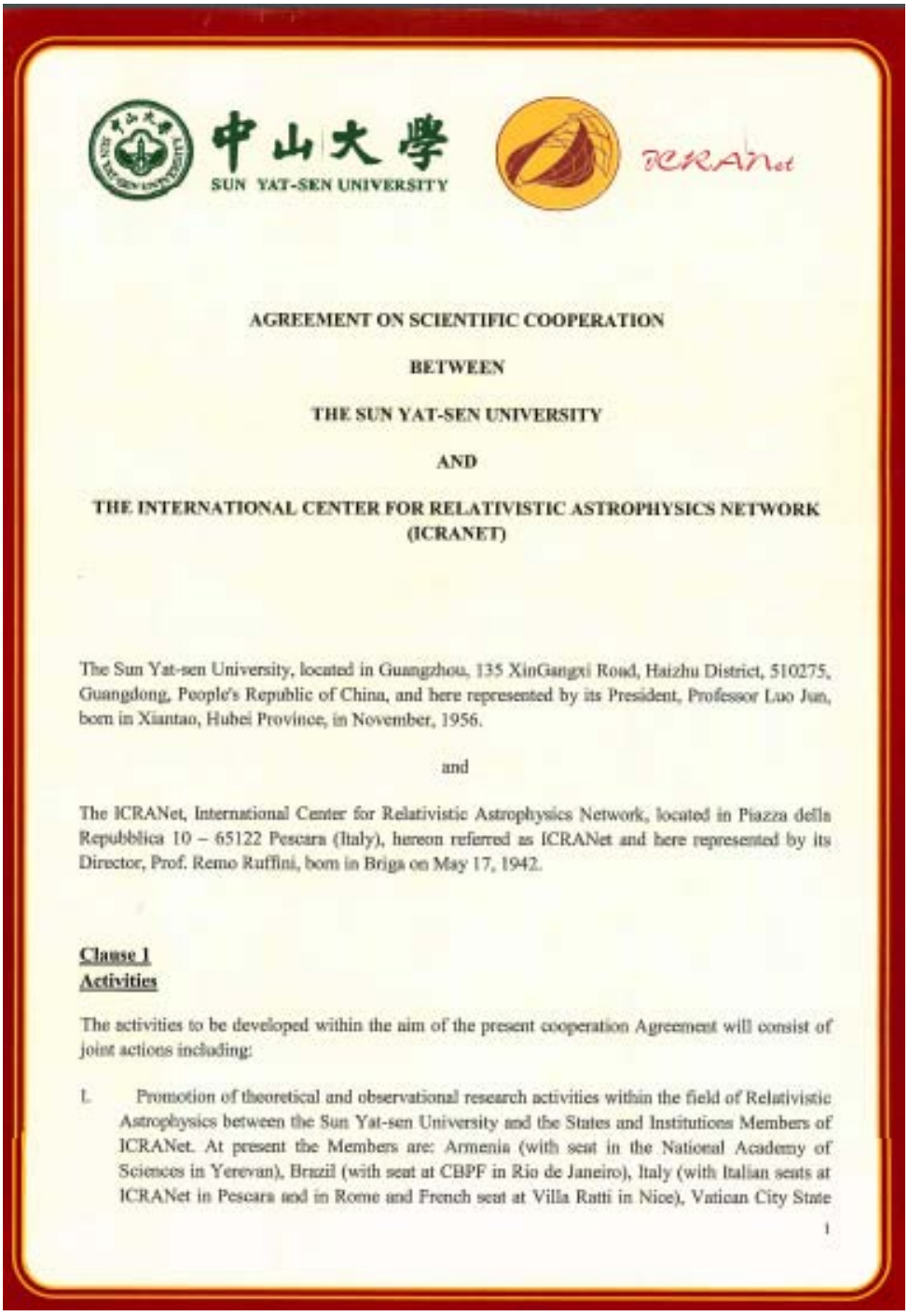
During the MG15 meeting, the President of Sun-Yat Sen University, Professor Luo Jun was invited to present a plenary talk on the Chinese mission Tian Qi, an important project of detecting gravitational wave.

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

1

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

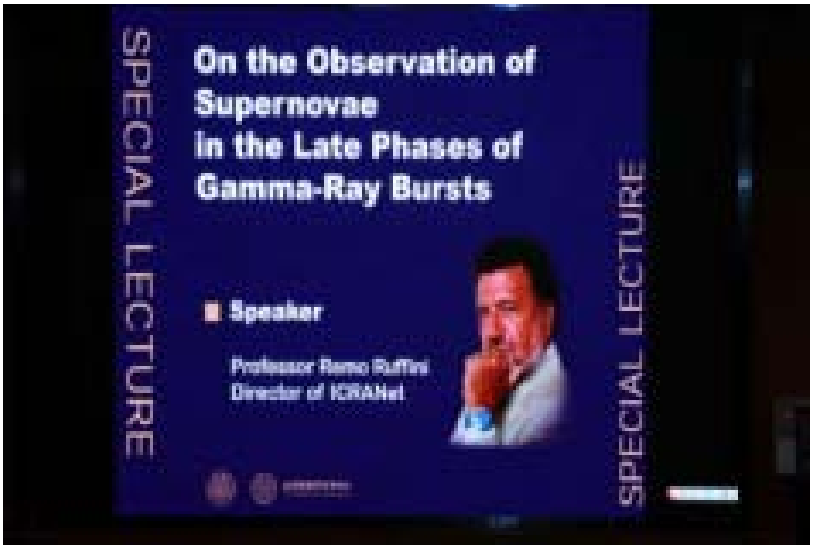
Eminent Professors and researches from this University enjoyed MG15, and took this opportunity to present their Institute and celebrate the signature of the cooperation agreement with ICRANet, by organizing the interesting event "*SYSU Connection reception*" in University of Rome La Sapienza.
The main 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

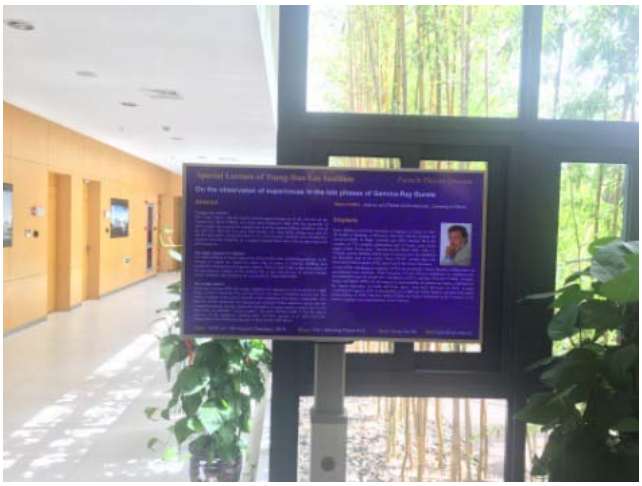


Professor Remo during his seminars at Tsinghua University (Beijing) and at the Tsung-Dao Lee Institute in Shanghai, August 2018.

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*".

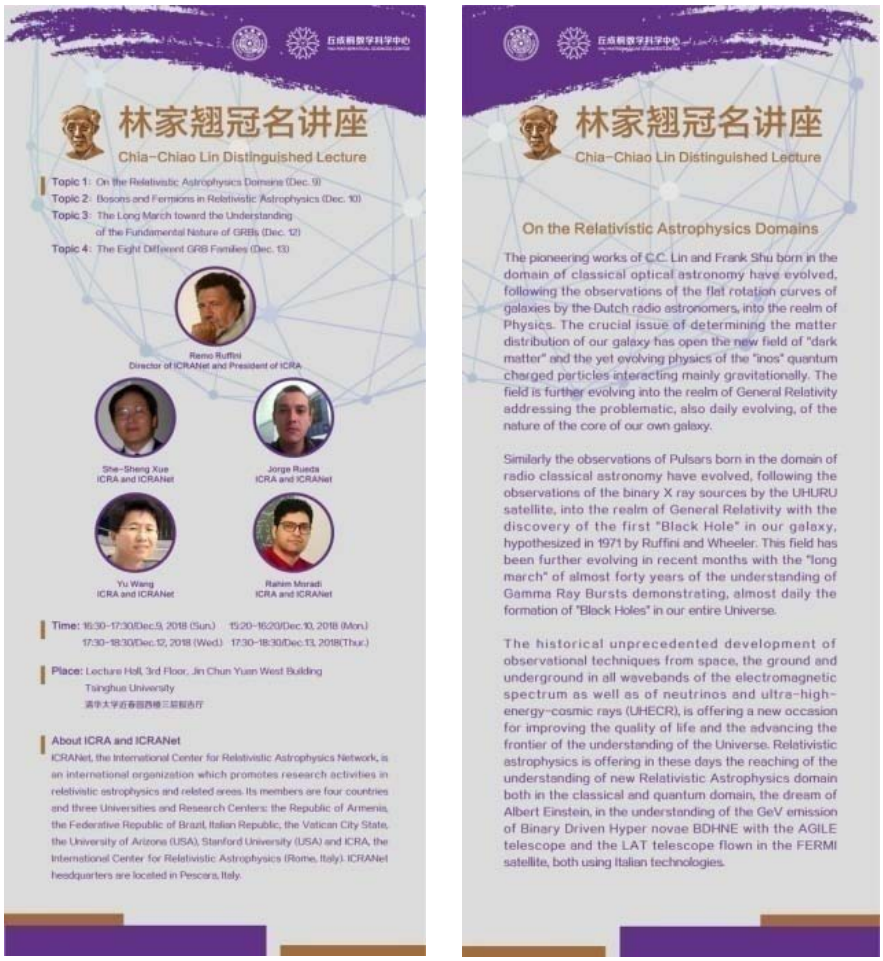
From left to right: Dr. Yu Wang, ICRANet PhD student, Prof. Remo Ruffini, Director of ICRANet, and Prof. Shing-Tung Yau, Director of Yau Mathematical Sciences Center at Tsinghua University in Beijing.



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.

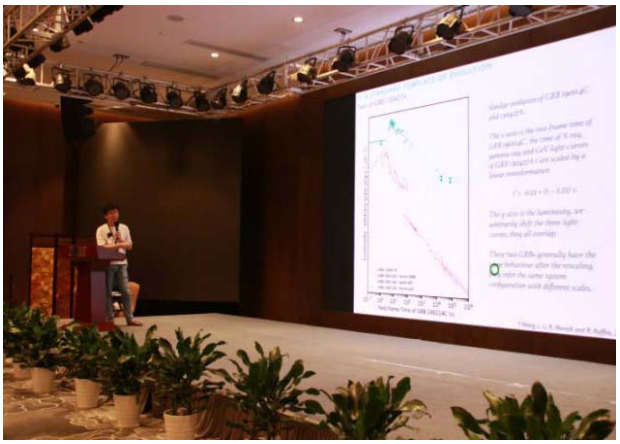
Group photo of the "Gamma-Ray Bursts and Related Astrophysics in Multi-Messenger Era" meeting, Nanjing, May 13-17, 2019.

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.

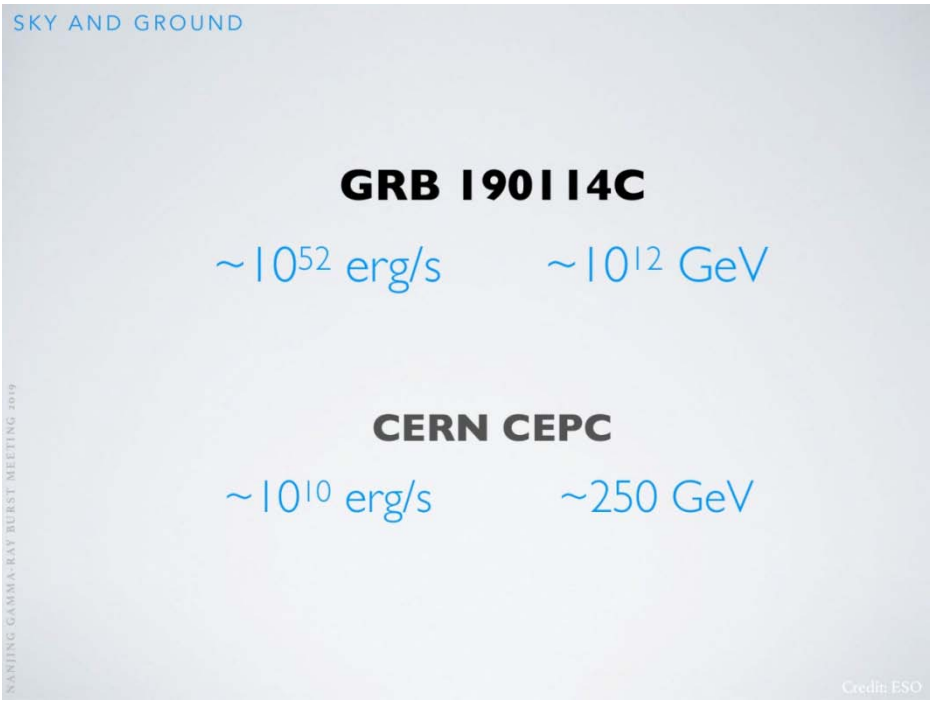
During his visit, Prof. Ruffini had the possibility to present the most recent scientific developments on which ICRANet is working on and to have fruitful exchange of ideas with other researchers from all over the world.

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"*.

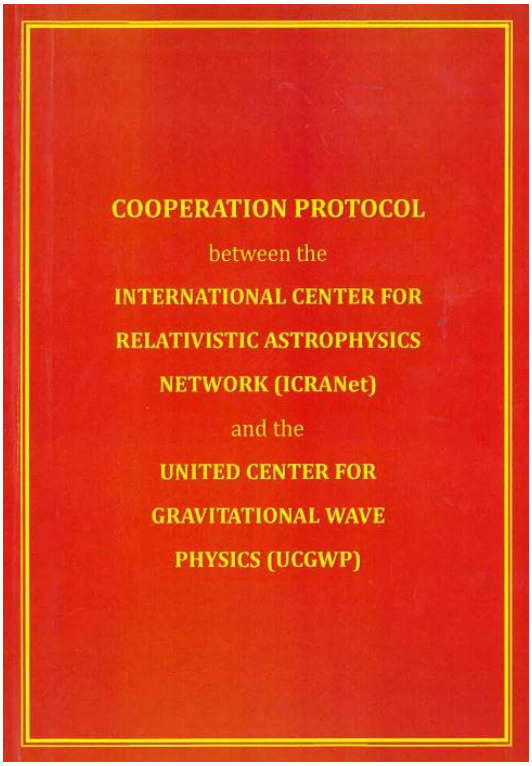
During his visit, Prof. Remo Ruffini had the opportunity to sign the cooperation protocol between ICRANet and UCGWP, the new center located in Zhejiang University of Technology, on October 12, 2019, together with Prof. Anzhong Wang (Director of UCGWP), Prof. Bin Wang (Vice Director of UCGWP) and Prof. 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.

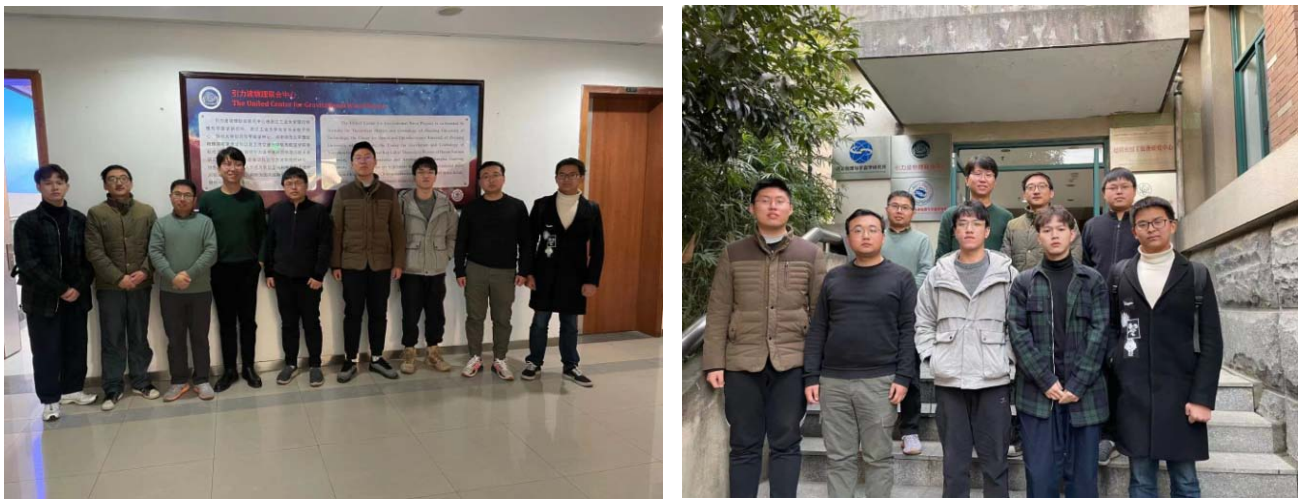
Accompanied by Prof. Ruffini, Dr Zheng visited also the University of Rome La Sapienza, the University Campus Bio-medico of Rome, as well as the University of L'Aquila. His visit was very fruitful and many young researchers and Ph.D. students are expected to come to ICRANet in the forthcoming years.

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.

Prof. Yu Wang and Prof. Liang Li's current activities in China

On the framework of the ongoing ICRANet collaboration agreements with Chinese Institutions, ICRANet Faculty Professors Wang Yu and Liang Li are currently visiting the United Center for Gravitational Wave Physics (UCGWP) in Hangzhou as well as the University of Science and Technology of China (USTC) in Hefei. During their visiting period, they are giving seminars and lectures as well as teaching to Chinese graduate and undergraduate students in those Institutions.

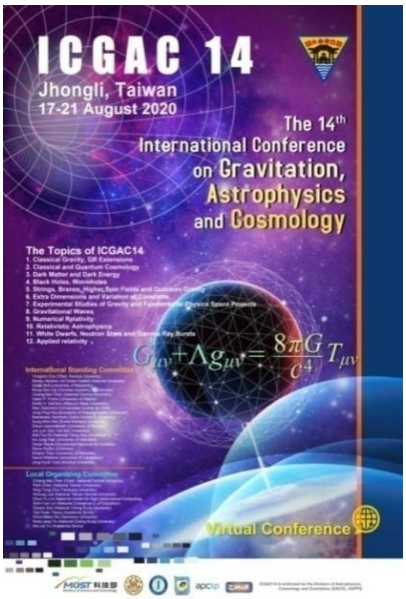


Prof. Yu Wang and Prof. Liang Li with some of their Chinese graduate and undergraduate students at UCGWP in Hangzhou.

At the same time, they're constantly keeping contacts and implementing their scientific collaboration with ICRANet online, e.g. participating to all the weekly GoToMeeting meetings with ICRANet Director and Faculty staff. On those occasions, also Prof. YiFu Cai and Prof. YeFei Yuan from USTC regularly join the meetings in order to discuss with ICRANet new scientific ideas as well as ongoing cooperation projects. Those will include online common research programs, institutional exchange of faculty members, researchers, post-doctorate fellows and students as well as USTC participation to the joint IRAP Ph.D. program. By its side, USTC is applying for Chinese National Funds for supporting students who would come to Italy for studying.

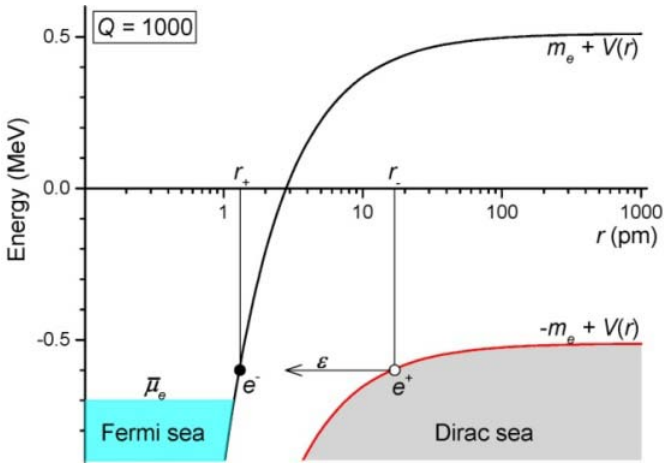
Regular weakly online meeting between ICRANet faculty members and Chinese scientists

The 14th International Conference on Gravitation, Astrophysics and Cosmology (ICGAC 14), August 17 – 21, 2020



The 2020 edition of the ICGAC 14 meeting has been held virtually from August 17 to 21 at the National Central University, Jhongli, in Taiwan. Prof. Ruffini, Director of ICRANet, gave a lecture titled *"The geodesic motion of S2 and G2 as a test of the fermionic dark matter nature of our galactic core"*, while Prof. Gregory Vereshchagin, ICRANet Faculty Professor, gave a lecture titled *"Diffusive photospheres and thermal emission in early afterglows of gamma-ray bursts"*. ICGAC14 is the series of biennial conferences on Gravitation, Astrophysics and Cosmology which take place in the Asia-Pacific region, with the goals to promote cooperation among the member countries and within an international context, high level studies on hot topics and to encourage young physicists on these fields. The website of the meeting: https://icgac14.phy.ncu.edu.tw

The remote online scientific collaborations between ICRANet Faculty members and researchers of Chinese Universities

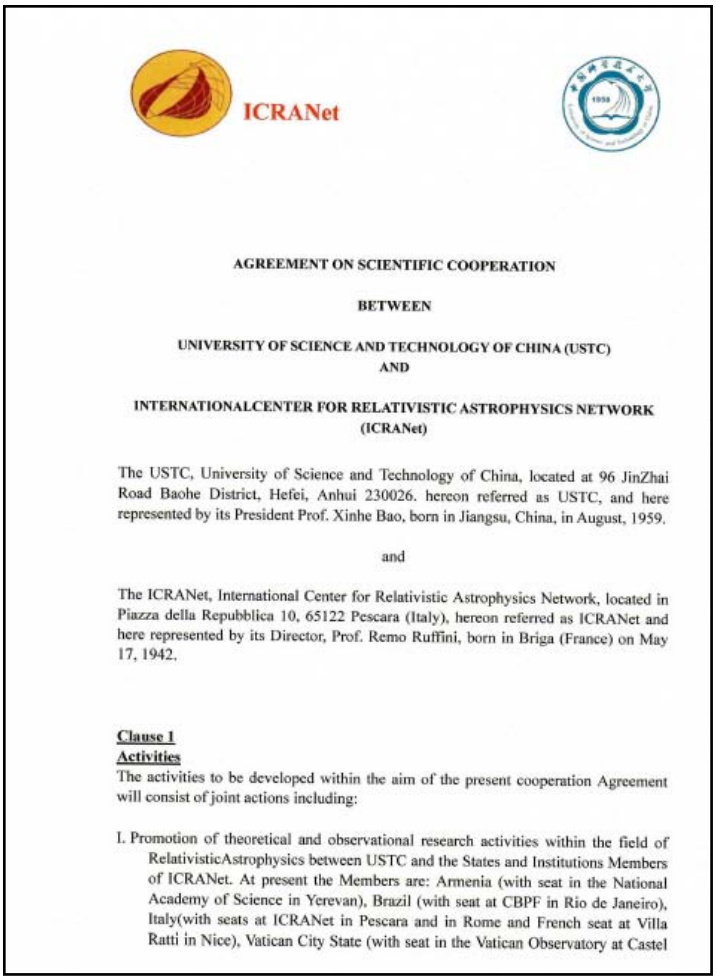


In astrophysical systems, there can possibly exist the strong coupling between nucleons and quark matters of large charge number Z and atomic number A, such as udQM nuggets, strangelets, and strangeon nuggets. In order to further understand electron-positron production in such strong coupling matter in connection with the observed phenomena and following the review article by R. Ruffini, G. Vereshchagin, and S.-S. Xue, Phys. Rep. 487, 1 (2010), a remote collaboration has been established (online) between Prof. Cheng-Jun Xia (Zhejiang University, Ningbo Institute of Technology), Prof. Ren-Xin Xu (Peking University, Shan-Gui Zhou of Institute of Theoretical Physics) and ICRANet Faculty Professor She-Sheng Xue. Our Chinese colleagues (Prof. Xia, Prof. Xu and Prof. Zhou) are experts on nuclear physics and astro-nuclear physics, in particular on the properties of nuclear and quark matter that compose compact stars in our Universe. The remote collaborations lead to the application of the theory founded and reviewed in ICRANet publication aforementioned, see figure below. The final results have been published in international high impact scientific journals worldwide.

C.-J. Xia, S.-S. Xue, R.-X. Xu, S.-G. Zhou *"Supercritically charged objects and electron-positron pair creation"*, Phys. Rev. D 101, 103031 (2020) - https://doi.org/10.1103/PhysRevD.101.103031

1. New cooperation agreement between the University of Science and Technology of China (USTC) and ICRANet

A cooperation agreement between ICRANet and the University of Science and Technology of China (USTC) has been signed by Prof. Xinhe Bao (President of USTC) and by Prof. Remo Ruffini (Director of ICRANet). 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. The agreement will be valid for 5 years.



ICRANet

AGREEMENT ON SCIENTIFIC COOPERATION

BETWEEN

UNIVERSITY OF SCIENCE AND TECHNOLOGY OF CHINA (USTC)
AND

INTERNATIONALCENTER FOR RELATIVISTIC ASTROPHYSICS NETWORK
(ICRANet)

The USTC, University of Science and Technology of China, located at 96 JinZhai Road Baohe District, Hefei, Anhui 230026. hereon referred as USTC, and here represented by its President Prof. Xinhe Bao, born in Jiangsu, China, in August, 1959.

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 (France) 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:

I. Promotion of theoretical and observational research activities within the field of RelativisticAstrophysics between USTC and the States and Institutions Members of ICRANet. At present the Members are: Armenia (with seat in the National Academy of Science in Yerevan), Brazil (with seat at CBPF in Rio de Janeiro), Italy(with seats at ICRANet in Pescara and in Rome and French seat at Villa Ratti in Nice), Vatican City State (with seat in the Vatican Observatory at Castel

The USTC is one of best Universities in China. Prof. Ruffini had the honor to visit this Institution and givethere lectures on the occasion of his first visit to China in 1978. Since then, a tight scientific cooperation between Italy and China has been established, and USTC has been one of the founding members of ICRA (International Center for Relativistic Astrophysics). For decades, many Chinese scientists have been educated and trained in ICRA, and collaborated to achieve many scientific relevant results. On the basis of this new cooperation agreement between USTC and ICRANet, their longstanding collaboration will be further implemented and strengthened on several aspects and issues.

Link to the electronic version of the agreement: http://www.icranet.org/documents/agreementICRANet-USTC.pdf

2. International joint PhD programme in Relativistic Astrophysics USTC- with the participation of ICRA and ICRANet

On April 2021, a cooperation agreement has been signed concerning the establishment of an international joint PhD programme in Relativistic Astrophysics (JIRA PhD) by the University of Sciences and Technology of China (USTC) and the University of Ferrara (UNIFE), with the participation of ICRA and ICRANet.
Both USTC and UNIFE have ongoing cooperation agreements with ICRANet; moreover, USTC has also signed 2 agreements with ICRA, aiming at the development of scientific research and academic training at Ph.D. level in the field of Relativistic Astrophysics, with the support of the infrastructures and the scientists of all the institutions with signed cooperation agreements with ICRA and ICRANet. As a result, ICRA and ICRANet will be collaborating with both parties in the framework of this agreement.
The main intent of this programme is to ensure a high level of education and high quality academics research in the field of Relativistic Astrophysics. It is addressed to highly qualified candidates from all the European and non-European nations who meet the admission criteria established by regulations in force at the Partner Institutions. With regard to the mobility of the Ph.D. students, the Parties agree that the curriculum of the Programme will include at least 12 months of research activity at each of the Partner Institutions. The mobility program can take place in one of the ICRANet centers, including institutions with a signed collaboration agreement with ICRANet, when approved by the Joint Coordination Committee, as long as it is located in a country different from the Institution of first enrolment of the doctoral students. In this case, the Joint Coordination Committee will assign a research co-tutor identified among the researchers associated with ICRANet with the appropriate qualification in the field of interest.

3. New Memorandum of Understanding and Agreement for cooperation in Relativistic Astrophysics (ICRA) - University of Sciences and Technology of China (USTC)

ICRA (International Center for Relativistic Astrophysics) has signed both a Memorandum of Understanding and an Agreement for cooperation in Relativistic Astrophysics with the University of Sciences and Technology of China (USTC). Both the documents have been signed by Prof. Yuao Chen (Dean of the School of Physical Sciences) and by Prof. Remo Ruffini (President of ICRA and Director of ICRANet).

The mission of both the Agreement for cooperation in Relativistic Astrophysics and the MoU will be to cooperate in research and education in the field of Relativistic Astrophysics. The ways in which collaboration in these fields may be realized include the exchange and visit of faculty/staff Professors as well as the implementation of joint education and research programs. Both parties agree to collaborate on graduate education in the field of Relativistic Astrophysics and each party can nominate up to five students annually as program candidates: those students should gain the required degree qualification and skill training in USTC first, and then screened out to come to ICRA for joint project R&D with attendance of the relevant lectures, if necessary. Both those joint documents will be valid for 5 years.

For the text of the Agreement for cooperation in Relativistic Astrophysics see: http://www.icranet.org/documents/agreementICRA-USTC.pdf

For the text of the Memorandum of Understanding see: http://www.icranet.org/documents/mouICRA-USTC.pdf

4. Scientific visitors from University of Sciences and Technology of China - USTC

Dr. Yunlong Zheng arrived on July 9, 2021 - ongoing

During his visit, he has the opportunity to discuss their scientific research and to have fruitful exchange of ideas with other ICRANet researchers. Non-singular cosmology, such as bouncing cosmology and emergent universe, has beenan very active area in the study of early universe for twenty years. In the past half year of visit, Dr. Yunlong has published two articles on this research topic. One article about bouncing cosmology following the previous work is published inJournal of Cosmology and Astroparticle PhysicsJCAP 11 (2021) 045, and the other one about emergent universeinJournal of High Energy PhysicsJHEP 11 (2021) 163. He also participated to the 16th Marcel Grossmann meeting (online) from ICRANet.

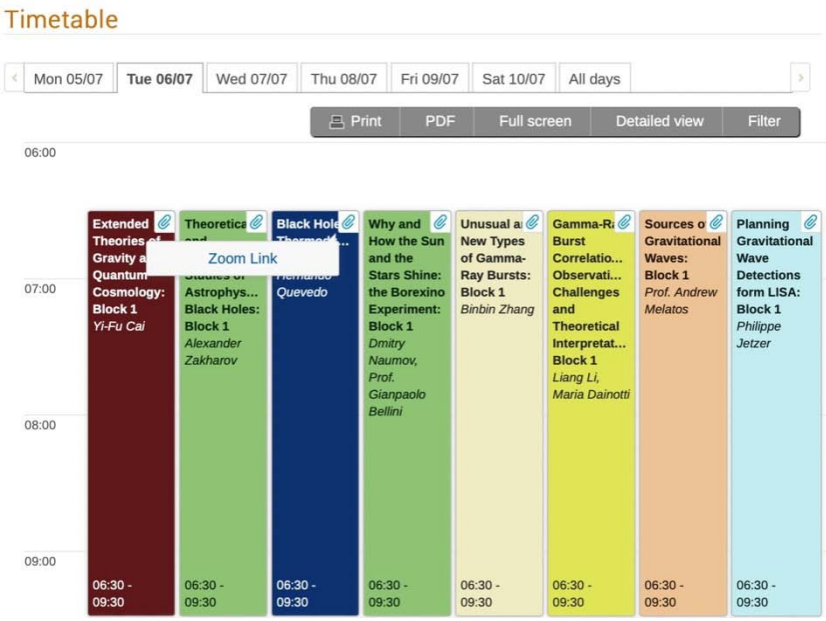
Prof. Ruffini and Dr. Yunlong visiting the group of Prof. Zurab in L'Aquila

5. Via cooperation with ICRANet, a USTC connection to Europe

The USTC Global Vista - Europe Day took place at the University of Sciences and Technology of China (USTC) and online from November 16 to 17, 2021. On that occasion, around 20 Universities and Colleges from Germany (RWTH Aachen University, University of Jena, University of Cologne, Technical University of Munich), France (French Higher Education Agency, Paris Technical School of Engineering, Nantes Centrale, EPITA French Higher School of Information Engineers, Tours and Orleans School of Engineering, ISEP Paris School of Electronics and Computer Information Engineers, Toulouse First University, French SKEMA Business School, Lyon Business School, France, ESSEC Business School), the Netherlands (University of Twente), Belgium (Dutch Free University of Brussels - VUB), Ghent University), Italy (ICRANet and the University of Ferrara - UNIFE), and Poland (University of Warsaw) jointly launched an online presentation of their PhD active programs.

Wednesday, November 17 was totally devoted to Astrophysics. On that occasion, Prof. Remo Ruffini (Director of ICRANet), followed by Prof. Jorge Rueda (ICRANet Faculty Professor, UNIFE) and Prof. Piero Rosati (UNIFE), have been invited to give a plenary lecture presentation. The day started with the opening remarks by Prof. Ruffini, Prof. Rosati and Prof. Rueda. The first lecture was presented by Prof. Ruffini on the occasion of the 50th anniversary of the article "Introducing the Black Hole" by Remo Ruffini and John A. Wheeler. The second lecture was presented by Prof. Rosati about the structure of the University of Ferrara and the new joint PhD program on Relativistic Astrophysics (JIRA PhD) established by USTC and UNIFE, with the participation of ICRANet and ICRA. The last lecture, on ICRANet Seats and structures, has been presented by Prof. Jorge Rueda. https://mp.weixin.qq.com/s/NG-FewMlj9zF2trS0re90A

6. Co-organizing MG16Meeting in China

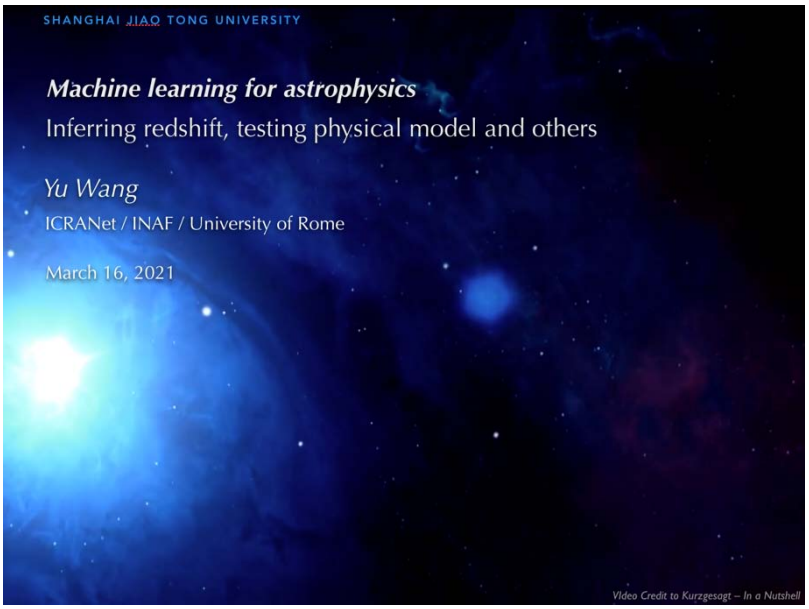


The timetable of the morning sessions that USTC assisted in organizing

The University of Science and Technology of China (USTC), as a member of ICRA, assisted in the organization of the Sixteenth Marcel Grossmann Meeting (MG16). Prof. Yu Wang visited USTC between 2 July and 10 July 2021 and, together with Prof. Yifu Cai, Prof. Wentao Luo, Dr. Amara Ilyas from USTC and Prof. Daniele Gregoris (Former PhD of ICRANet) from Jiangsu University of Science and Technology (JUST), successfully co-organized the MG16 morning series of sessions. Prof. Yu Wang also visited Prof. Yefei Yuan, former Head of the Department of Astronomy, during his visit.

7. ICRANet faculty members visiting Chinese Institutions

(a) Prof. Yu Wang visiting Shanghai Jiaotong University



The presentation given by prof. Yu Wang in Shanghai Jiaotong University

On 16 March 2021, Prof. Yu Wang visited Shanghai Jiao Tong University (SJTU) for an academic discussion with the Dean of the School of Astronomy, the academician of the Chinese Academy of Sciences, Prof. Jing Yipeng and his research group. The presentation, entitled "Machine learning for astrophysics: inferring redshift, testing physical models and others", was well received, with lots of questions from the audience and ongoing discussions afterwards.

(b) Profs. Liang Li and Prof. Yu Wang visiting institutes in Hangzhou

From left to right, Profs. Tao Zhu, Qiang Wu, Liang Li and Yu Wang in the campus near the west lake of Hangzhou

From 6 March to 6 April, 2021， Prof. Liang Li, and from 24 March to 30 March, 2021, Prof. Yu Wang were invited by Prof. Tao Zhu, and Prof. Qiang Wu, visited the United Center for Gravitational Wave Physics (UCGWP) in Hangzhou. During the visit, Prof. Liang Li and Prof. Yu Wang had in-depth exchanges with Prof. Tao Zhu, and Prof. Qiang Wu and their group on gravitational wave, cosmology,polarization, and Fermi satellite data analysis.

(c) Profs. Liang Li and Prof. Yu Wang visiting Zhejiang University

Prof. Liang Li is giving a lecture of the multi-wavelength observation of GRB

Invited by Prof. Kang Xi, Prof. Liang Li and Prof. Yu Wang visited Zhejiang University (ZJU) on 27 March 2021, during which they discussed scientific topics of common interest, including cosmology, gamma bursts, and deep learning. They also exchanged information on the latest developments in telescopes and satellites. During the visit, Prof. Liang Li gave a presentation entitled "Multi-band observational properties of gamma-ray bursts-from early transient emission to late afterglow emission", which was very well received.

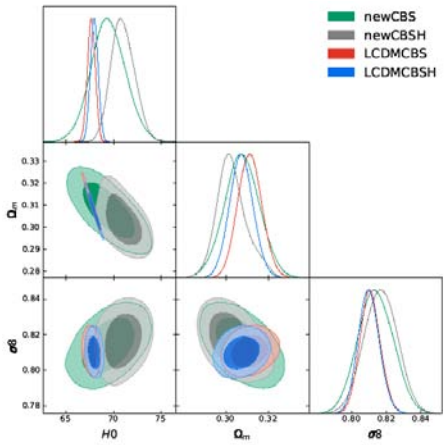
(d) Prof. Yu Wang visiting Nanchang University

Prof. Qinwen Tang (left) and Prof. Yu Wang (right) in Bayi Square of Nanchang

Prof. Yu Wang was invited by Prof. Qingwen Tang to visit Nanchang University from 13 to 17 April 2021. During the visit, Yu Wang gave a presentation on the deep learning for astrophysics, during which he had in-depth discussions with Prof. Tang and his group on the physical mechanisms of gamma-ray bursts and the data processing of the Fermi satellite. The common interest with Qingwen Tang's group led to several subsequent exchanges of work and mutual assistance.

8. The remote online scientific collaborations between ICRANet Faculty members and researchers of Chinese Universities

The understanding of dark energy and matter interactions is an important issue in the standard cosmologyΛCDM model, which suffers from H0 tension. Following the article by S.-S. Xue, Nucl.Phys.B897(2015), 326-345,arXiv:1410.6152, studying the model of time-varying cosmological constant.A remote collaboration has been established (online) between Prof. Xin Zhang and PhD students Li-Yang Gao and Ze-Wei Zhao (Northeastern University, China) and ICRANet Faculty Professor She-Sheng Xue. Two data combinations, CMB+BAO+SN and CMB+BAO+SN+H0 are adopted to analyze the model. It is found find that the H0 tension can be greatly relieved from 4.2σ to 0.71σ. The final results have been published in international high impact scientific journals worldwide. JCAP 07 (2021) 005, https://arxiv.org/abs/2101.10714



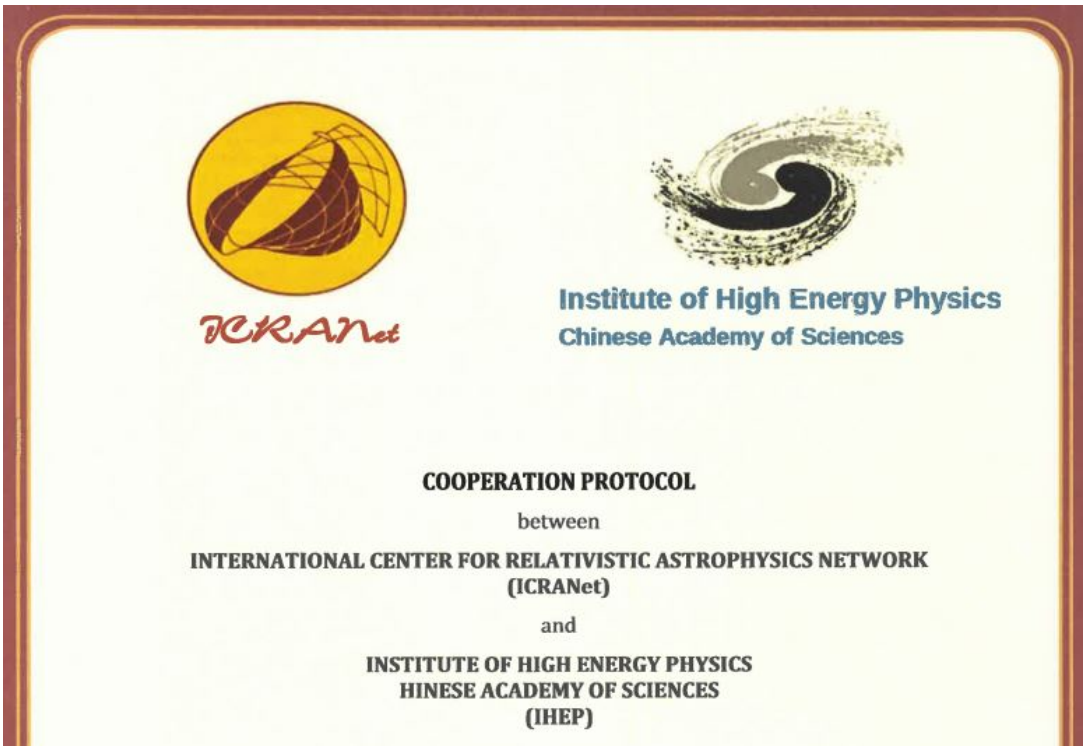
Automatic Zoom

Data	CBS		CBSH	
Model	CPL	$e\tilde{\Lambda}$CDM	CPL	$e\tilde{\Lambda}$CDM
Ω_b	$0.0481^{+0.0012}_{-0.0013}$	$0.0488^{+0.0036}_{-0.0035}$	$0.0457^{+0.0011}_{-0.0010}$	$0.0425^{+0.0015}_{-0.0014}$
Ω_c	$0.2603^{+0.0073}_{-0.0069}$	$0.2604^{+0.0072}_{-0.0073}$	$0.2478^{+0.0066}_{-0.0054}$	$0.2607^{+0.0072}_{-0.0073}$
w_0	$-1.0439^{+0.0964}_{-0.0846}$	–	$-1.1216^{+0.0930}_{-0.0848}$	–
w_a	$0.0823^{+0.2852}_{-0.3685}$	–	$0.1517^{+0.3113}_{-0.3585}$	–
δ_G	–	$0.0009^{+0.0042}_{-0.0043}$	–	$-0.0066^{+0.0023}_{-0.0022}$
δ_Λ	–	$-0.0525^{+0.1365}_{-0.1466}$	–	$-0.2832^{+0.1025}_{-0.0966}$
H_0 [km s^{-1} Mpc^{-1}]	$68.23^{+0.90}_{-0.86}$	$67.71^{+2.64}_{-2.40}$	$69.98^{+0.71}_{-0.81}$	$72.69^{+1.23}_{-1.28}$
Ω_m	$0.3084^{+0.0083}_{-0.0080}$	$0.3092^{+0.0078}_{-0.0081}$	$0.2935^{+0.0075}_{-0.0062}$	$0.3031^{+0.0073}_{-0.0073}$
H_0 tension	3.47σ	2.18σ	2.51σ	0.71σ
$\chi^2_{\rm min}$	1043.045	1043.037	1054.865	1047.409
ΔAIC	3.498	3.501	-2.794	-10.250
ΔBIC	13.431	13.423	7.133	-0.323

Table 3. The constraint results of parameters in the two-parameter extension models with the CBS and CBSH data

ICRANet-China activities in 2022

Renewal of the cooperation protocol between ICRANet and the Institute of High Energy Physics within the Chinese Academy of Sciences (IHEP CAS), March 7, 2022



On March 7, 2022, the Cooperation Protocol between ICRANet and the Institute of High Energy Physics within the Chinese Academy of Sciences (IHEP CAS) has been renewed. The renewal was signed by Prof. Shuang-Nan Zhang (Director of the Key Laboratory of Particle Astrophysics at IHEP CAS) and by Prof. Remo Ruffini (Director of ICRANet). This agreement will be valid for further 5 years and the main joint activities to be developed under its framework 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, the development of inter-institutional research areas associated to local graduate programs and joint publications.
For the text of the agreement: http://www.icranet.org/ihep

Dr. Yunlong Zheng completed his visit of ICRANet

Dr. Yunlong Zheng and Dr.Stanislav Komarov in ICRANet guest house

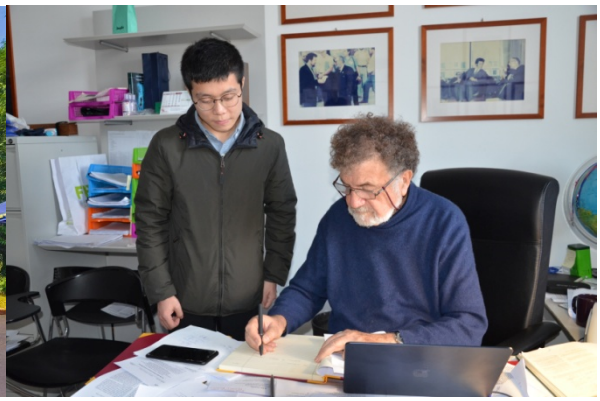
As part of the recent collaboration agreements signed between ICRANet, ICRA and USTC, Dr Yunlong Zheng arrived at ICRANet Pescara on July 7, 2021 and completed his stay on July 15, 2022. We collaborated on research on Gravity, Cosmology (especially in the early universe, including bounce cosmology and the emergent universe) and Relativistic Astrophysics during his postdoctoral fellowship in astrophysics. He conducts scientific research activities at all ICRA/ICRANet centers and institutions. We already have fruitful academic achievements thanks to Yunlong's diligent work and rapid learning.

We have completed and published three papers, focusing on bounce cosmology, emergent universes, and GRB physics. A study on bounce cosmology, published as JCAP 11 (2021) 045, examined both scalar and tensor perturbations. Published in JHEP 11 (2021) 163, the work on the emergent universe improved on JHEP 01 (2021) 141, which dealt with DHOST genesis. As shown in the very recent work GRB 190829A - A Showcase of Binary Late Evolution, the triple-wavelength afterglows in GRB 190829A are consistent with a binary-driven hypernova of type II.

Moreover, we have successfully organized the Sixteenth Marcel Grossmann Meeting-MG16 to provide an opportunity for discussions on recent advances in gravitation, general relativity, and relativistic field theories, as well as a conference commemorating Prof. Remo Ruffini's 80th birthday. In the near future, we hope that ICRANet and USTC will collaborate and produce more academic achievements.

Joint Doctoral student Zhang Shurui arrived on December 15, 2022

Zhang Shurui is a doctoral student participating in the international Joint International Relativistic Astrophysics doctorate program, from USTC, with the major in Astronomy. His research interests relate to black holes, AGN, and compact objects and their observational effects. He visited ICRANet center in Pescara since December 15, 2022. His visit is ongoing, during which he has the opportunity to study and research with Prof. Ruffini. Prof. Ruffini not only guided him to learn a lot of basic knowledge of black holes, but also discussed important research directions with him. During this period, he also has the opportunity to discuss research topics with other ICRANet scientists, which promoted scientific cooperation between ICRANet and USTC.



The cooperation protocol between ICRANet and the University of South China

ICRANet

南華大學
UNIVERSITY OF SOUTH CHINA

COOPERATION PROTOCOL

between

INTERNATIONAL CENTER FOR RELATIVISTIC ASTROPHYSICS NETWORK (ICRANet)

and

UNIVERSITY OF SOUTH CHINA

The International Center for Relativistic Astrophysics Network (ICRANet), represented by its Director, **Prof. Remo Ruffini,** and the University of South China (USC), represented by its President, **Prof. Dr. Zhang Zhuohua**, agree to establish this Cooperation Protocol which is governed by the following clauses:

The Cooperation Protocol between ICRANet and the University of South China has been signed signed by Prof. Zhang Zhuohua (President of Dean of University of South China) and by Prof. Remo Ruffini (Director of ICRANet). This agreement will be valid for further 5 years and the main joint activities to be developed under its framework 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, the development of inter-institutional research areas associated to local graduate programs and joint publications.
the University of South China : https://english.usc.edu.cn/

The remote online scientific collaborations between ICRANet Faculty members and researchers of Chinese Universities

The understanding of dark energy and matter interactions is an impor tant is suein the s tandard cosmology ΛCDM model, which suffers from H0 and S8 tension. Following the article by S.-S. Xue, Nucl.Phys.B897(2015), 326-345,arXiv:1410.6152, studying the model of time-varying cosmological constant. A remote collaboration has been established (online) between Prof. Xin Zhang and PhD students Li-Yang Gao (Northeastern University, China) and ICRANet Faculty Professor She-Sheng Xue. Two data combinations, CMB+BAO+SN and CMB+BAO+SN+H0 are adopted to analyze the model. It is found find that the H0 tension can be greatly relieved from 4.2σ to 0.71σ. The final results have been published in international high impact scientific journals worldwide. JCAP 07 (2021) 005, https://arxiv.org/abs/2101.10714.
In the year 2022, this issue has been further studied and we find the S8 tension is relived as well. The article will be published soon.