Enclosure 3

Activities of the ICRANet Iran Seat

ICRANet-Mazandaran Iran Seat

Summary

Introduction

University of Mazandaran (UMZ), currently the largest state higher education center in Mazandaran Province, used to consist of a number of higher education centers. In 1979, the centers were officially merged to form today's College of Mazandaran. In recent years, UMZ has made significant progress and developed both qualitatively and quantitatively. It currently comprises 12 faculties on its campus: Faculty of Mathematical Sciences, Faculty of Theology and Islamic Sciences, Faculty of Marine and Oceanic Sciences, Faculty of Basic Sciences, Faculty of Arts and Architecture, Faculty of Law and Political Sciences, Faculty of Physical Education and Sports Sciences, Faculty of Humanities and Social Sciences, Faculty of Economics and Management Sciences, Faculty of Chemistry, Faculty of Technology and Engineering and Faculty of Heritage, Crafts and Tourism.

UMZ currently has around 12000 students studying at Bachelor, Master, PhD and postdoctoral levels and over 400 faculty members teaching and researching in the university's various faculties. As of 2016, more than 15000 students have graduated from the various faculties of our university. Based on the policy of Iran's Ministry of Science, Research and Technology (MSRT), UMZ is committed to providing quality education and innovative research at undergraduate, master's and Ph.D. levels leading to scientific and technological achievements.

Main office building of UMZ

University of Mazandaran

ICRANet is the best known and most important research center for relativistic astrophysics in the world. One of ICRANet's main tasks is to promote the growth and development of international activities in the field of relativistic astrophysics and other physics-related fields in various countries. ICRANet was founded in 1985 by the renowned Italian physicist Professor Remo Ruffini (one of the best scientists in the world), Professor Riccardo Giacconi (winner of the 2002 Nobel Prize in Physics), Professor Abdul Salam (winner of the 1979 Nobel Prize in Physics), Professor Paul Boynton (Professor at George Washington College) and several other leading physicists. Professor Remo Ruffini has been the director of this research institute since 2005.

ICRANet-Mazandaran is located on the campus of UMZ, Babolsar, Mazandaran, Iran. The center was established in September 2020 following a Memorandum of Understanding between ICRANet, represented by Professor Remo Ruffini, and UMZ, represented by Professor Kourosh Nozari. The main objectives of this memorandum of understanding are to promote the development and dissemination of scientific and technological research in the fields of cosmology, gravitation and relativistic astrophysics between ICRANet and UMZ.

The ICRANet center of the UMZ was inaugurated on Saturday, February 28, 2021. The inauguration ceremony was attended by Professor Kourosh Nozari and Professor Behzad Eslam Panah. The ICRANet-Mazandaran now has about 3 members who are currently working in various fields of gravitation, cosmology and astrophysics. From 2020 to 2023, ICRANet-Mazandaran members have published more than 60 papers in international journals. This center has a website with the following address:

http://en.umz.ac.ir/index.aspx?&siteid=122&pageid=16197

From left to right: Prof. Azizi, Prof. Eslam Panah and Prof. Nozari

From left to right: Prof. Azizi, Prof. Nozari and Prof. Eslam Panah

Seat agreement

The UMZ and ICRANet signed a Memorandum of Understanding in September 2020. This Memorandum of Understanding comprises ten clauses. Further details can be found in the cooperation protocol on the following pages.

ICRANet

University of Mazandaran

COOPERATION PROTOCOL

between

INTERNATIONAL CENTER FOR RELATIVISTIC ASTROPHYSICS NETWORK (ICRANet)

and

UNIVERSITY OF MAZANDARAN

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

FIRST:
The main objectives of this MoU are to promote the development and dissemination of scientific and technological research in the fields of cosmology, gravitation and relativistic astrophysics between ICRANet and University of Mazandaran.

SECOND:
The activities to be undertaken under this Cooperation Protocol will consist of joint actions involving one or more of the following items:

I – The institutional exchange of graduate, post-graduate students, researchers and faculty members of ICRANet and University of Mazandaran;

II – The development of teaching and/or research activities related to the areas of expertise and interest of ICRANet and University of Mazandaran;

III – The organization of symposia, seminars, conferences and short courses on topics and areas of expertise and interest of ICRANet and University of Mazandaran;

IV – The promotion and support of technical-scientific and cultural events and activities open to the public;

V – The development of opportunities to form university teachers and researchers, by means of specialized advanced high-level courses in areas of interest and expertise of ICRANet and University of Mazandaran;

VI –The organization of training and recycling courses and activities as well as the developing of inter-institutional research areas associated to local graduate programs;

VII –The promotion of joint publications;

VIII – Implementation of socially oriented activities through the academic extension;

IX – Exchange of information concerning teaching and research activities in both institutions signatory of this Cooperation Protocol.

THIRD:

The implementation of the activities envisaged by the contracting parties will be specified by means of Work Plans relative to this MoU, to be signed by the contracting parties at the time of definition of common projects, areas of research and education, or any other activities of mutual interest.

FOURTH:

The institutions signatories of this Cooperation Protocol shall adopt, as a general principle, and to the extent of their budgetary possibilities, the financing of academic actions carried out by this MoU. In the specific case of exchange of professional between the signatory institutions, the visiting institution shall endeavor efforts to cover transportation expenses of their students, professors and technicians while the hosting institution may cover their living expenses. To finance such expenses, participants must apply to granting agencies and other national or international institutions.

Students, professors, researchers and administrative staff taking part in exchange activities must have health insurance valid during those activities paid by the visiting part.

FIFTH:

When activities originating from this MoU result in products, improvements or innovations, subject to rights, both parties will establish - according to the law and to proper regulatory legislation, by means of specific MoU's and proportionally to the contribution of each institution - the conditions that will regulate property rights.

SIXTH:
The activities developed within the scope of this Cooperation Protocol will be carried by members of both parties, appointed by each institution, according to the nature of the activities in each project, the parties being allowed to rely upon the support of external organizations.

An overall coordinator will be appointed for each of the signing Institutions in order to monitor and supervise the implementation and progress of programs and projects related to the present Cooperation Protocol and to establish plans for the future of this cooperation.

For University of Mazandaran:
Prof. Kourosh Nozari, President of the University of Mazandaran;

For ICRANet:
Prof. Remo Ruffini, Director of ICRANet;

The coordinators will meet at least once a year or by electronic means (such as e-conference), or through visits to partner institutions.

SEVENTH:
This MoU will be valid for 5 (five) years, starting from the date of its signature. It will be extended automatically for another 5 (five) years through an exchange of letters between the signatories.

EIGHTH:
This MoU may be canceled by either of the parties, by means of a notification at least 60 (sixty) days in advance – which may be waived if both parties come to a consensual agreement – being advisable, however, to attempt to ensure that ongoing activities are maintained.

NINTH:
Any necessary modification to the present Cooperation Protocol must be stated in Additional Terms that will be negotiated between the parties, without prejudice to ongoing activities.

In particular this MoU could be extended to other partnerships, through the express agreement of the parties through an Additional Term.

TENTH:

For purposes of this Cooperation Protocol, the parties establish their addresses as:
ICRANet: *ICRANet Coordinating Center; Piazza della Repubblica, 10, 65122 Pescara, Italy*; and
University of Mazandaran: *Department of Physics, Faculty of Basic Sciences, P. O. Box 47416-95447, Babolsar, Iran*;
through which the correspondence held between with respect to the interpretation and enforcement of this Cooperation Protocol should be formalized.

All terms having been agreed upon, the representatives of the parties signed the present MoU in 2 (two) copies in English.

K. Nozari

PROF. KOUROSH NOZARI
President of the University of Mazandaran

24.08.2020
DATE:

R Ruffini

PROF. REMO RUFFINI
Director of ICRANet

DATE: AUGUST 3, 2020

M. Azizi

PROF. MAHMOUD AZIZI
University of Mazandaran

24 August, 2020
Date:

PROF. NAREK SAHAKYAN
Director of ICRANet Seat in Yerevan

Date: August 3, 2020

Members of ICRANet-Mazandaran

Behzad Eslam Panah (Coordinator)

Dr. Behzad Eslam Panah is currently Assistant Professor of Theoretical Physics at UMZ, Iran. He received his PhD from Shiraz University in 2017 on “Massive compact objects in modified theories of gravitation”. From 2018 to 2019, he worked as a postdoctoral researcher at Shiraz University on the topic of “Hybrid and Quark Stars". He is working on various interesting topics in theoretical physics, such as complicated solutions for black holes, nonlinear electrodynamics, thermodynamics of black holes, the structure of compact objects (neutron stars, white dwarfs, hybrid stars and quark stars) and dark energy stars in modified theories of gravity.

Kourosh Nozari

Dr. Kourosh Nozari is currently Professor of Theoretical Physics at UMZ, Iran. He received his PhD degree in “Cosmology of the Early Universe" from Sharif University of Technology. He is currently working on various topics in theoretical physics, mainly cosmology of the early universe, phenomenology of quantum

gravity and black hole physics. He leads an active research group in the Department of Theoretical Physics at UMZ.

Narges Rashidi

Dr. Narges Rashidi is currently an assistant professor of theoretical physics at UMZ, Iran. She received her PhD from Mazandaran University in 2014 on the cosmological dynamics of scalar fields in the braneworld. She is working on various interesting topics in theoretical physics such as cosmological inflation, primordial perturbations and non-Gaussianity, the effects of natural limits in cosmology, dark energy and late time acceleration.

Scientific activity of ICRANet-Mazandaran

osmology of the early universe, the physics of black holes, complicated solutions for black holes and their thermodynamics in the presence of (non-)linear electrodynamics and modified theories of gravitation, the phenomenology of quantum gravity, the structure of compact objects (such as neutron stars, white dwarfs, hybrid stars and quark stars), AdS/CFT correspondence, dark energy and dark matter. In short, the members of ICRANet-Mazandaran are working on the following topics:

1. **Gravity**
    - Modified Theories of Gravity
    - AdS/CFT correspondence
    - Quantum Gravity
    - Gravitational waves
    - Gravastars
    - Black Holes Physics

2. **Astrophysics**
    - Neutron Stars
    - Quark Stars

3. **Cosmology**
    - Dark Energy and Dark Matter
    - Inflation and Cosmological Perturbations

Recent publications (2023)

1- **Charged Accelerating BTZ black holes**
Behzad Eslam Panah

Journal Ref: Fortschritte der Physik. 71 (2023) 2300012

DOI: https://doi.org/10.1002/prop.202300012

arXiv: https://arxiv.org/abs/2203.12619

2- **Black holes in dRGT massive gravity with the signature of EHT observations of M87***

Seyed Hossein Hendi, Khadije Jafarzade, and Behzad Eslam Panah

Journal Ref: Journal of Cosmology and Astroparticle Physics. 02 (2023) 022

DOI: https://doi.org/10.1088/1475-7516/2023/02/022

arXiv: https://arxiv.org/abs/2206.05132

3- **Stable three-dimensional (un)charged AdS gravastars in gravity's rainbow**

Horrieh Barzegar, Mohsen Bigdeli, Gholam Hossein Bordbar, and Behzad Eslam Panah

Journal Ref: European Physical Journal C 83 (2023) 151

DOI: https://doi.org/10.1140/epjc/s10052-023-11295-3

arXiv: https://arxiv.org/abs/2302.02433

4- **Effect of massive graviton on dark energy star structure**

Alliyeh Bagheri Tudeshki, Gholam Hossein Bordbar, and Behzad Eslam Panah

Journal Ref: Phys. Dark Universe. 42 (2023) 101354

DOI: https://doi.org/10.1016/j.dark.2023.101354

arXiv: https://arxiv.org/abs/2303.04813

5- **Topological phantom AdS black holes in *F*(*R*) gravity**

Behzad Eslam Panah, and Mannuel E Rodrigues

Journal Ref: European Physical Journal C 83 (2023) 237

DOI: https://doi.org/10.1140/epjc/s10052-023-11402-4

arXiv: https://arxiv.org/abs/2303.12815

6-**Three-dimensional energy-dependent *C*-metric: black hole solutions**

Behzad Eslam Panah

Journal Ref: Physics Letters B 844 (2023) 138111

DOI: https://doi.org/10.1016/j.physletb.2023.138111

arXiv: https://arxiv.org/abs/2307.15371

7-**Three-dimensional accelerating AdS black holes in *F*(*R*) gravity**

Behzad Eslam Panah, Mohsen Khorasani, and Jalil Sedaghat

Journal Ref: European Phyiscal Journal Plus. 138 (2023) 728

DOI: https://doi.org/10.1140/epjp/s13360-023-04339-w

arXiv: https://arxiv.org/abs/2309.02472

8-**Structure of 3*D* gravastars in the context of massive gravity**

Horrieh Barzegar, Behzad Eslam Panah, Gholam Hossein Bordbar, and Mohsen Bigdeli

Journal Ref: Physics Letters B 847 (2023) 138280

DOI: https://doi.org/10.1016/j.physletb.2023.138280

arXiv: https://arxiv.org/abs/2310.18287

9-**Effect of rainbow function on the structural properties of dark energy star**

Aalliyeh Bagheri Tudeshki, Gholam Hossein Bordbar, and Behzad Eslam Panah

Journal Ref: Physics Letters B 848 (2024) 138333

DOI: https://doi.org/10.1016/j.physletb.2023.138333

arXiv: https://arxiv.org/abs/2311.13138

10-**Accretion onto a static spherically symmetric regular MOG dark compact object**

Kourosh Nozari, Sara Saghafi, and Fateme Aliyan

Journal Ref: European Physical Journal C 83, 449 (2023)

DOI: https://doi.org/10.1140/epjc/s10052-023-11620-w
arXiv: https://arxiv.org/abs/2305.17186

A member of ICRANet-Mazandarn among the top two percent of the most cited authors in 2023

The latest update of the publicly accessible database of over 100,000 top scientists listed by Elsevier in 2023 shows that Prof. Behzad Eslam Panah is on this list.

Prof. Behzad Eslam Panah

The member of ICRANet-Mazandaran as editor in two international journals

Prof. Behzad Eslam Panah is an editor in **Galaxies** and **Frontiers in Physics** journals.

- **Galaxies**
  https://www.mdpi.com/journal/galaxies

- **Frontiers in Physics**
  https://www.frontiersin.org/journals/physics/sections/high-energy-and-astroparticle-physics