

Iran Node

Yasaman Farzan
IPM, Tehran

The map of the country



Some figures and facts

119 public universities •

Some figures and facts

119 public universities •

1230 private universities •

•

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1230 private universities •

4 million college students •

Some figures and facts

119 public universities ●

1230 private universities ●

4 million college students ●

700000 college students in public universities ●

Some figures and facts

119 public universities •

1230 private universities •

4 million college students •

700000 college students in public universities •

About 60 % female •

Total number of physics students

39121 college students •

Total number of physics students

39121 college students •

22nd most popular major! •

Tehran university



Physics department



Other universities in Tehran



Sharif University ●

Shahid Beheshti Univ ●

Tarbiat Modarres univ ●

Alzahra University ●

..... ●

Universities in other provinces



Tabriz university

Isfahan university of technology

Ferdowsi of Mashhad University

....

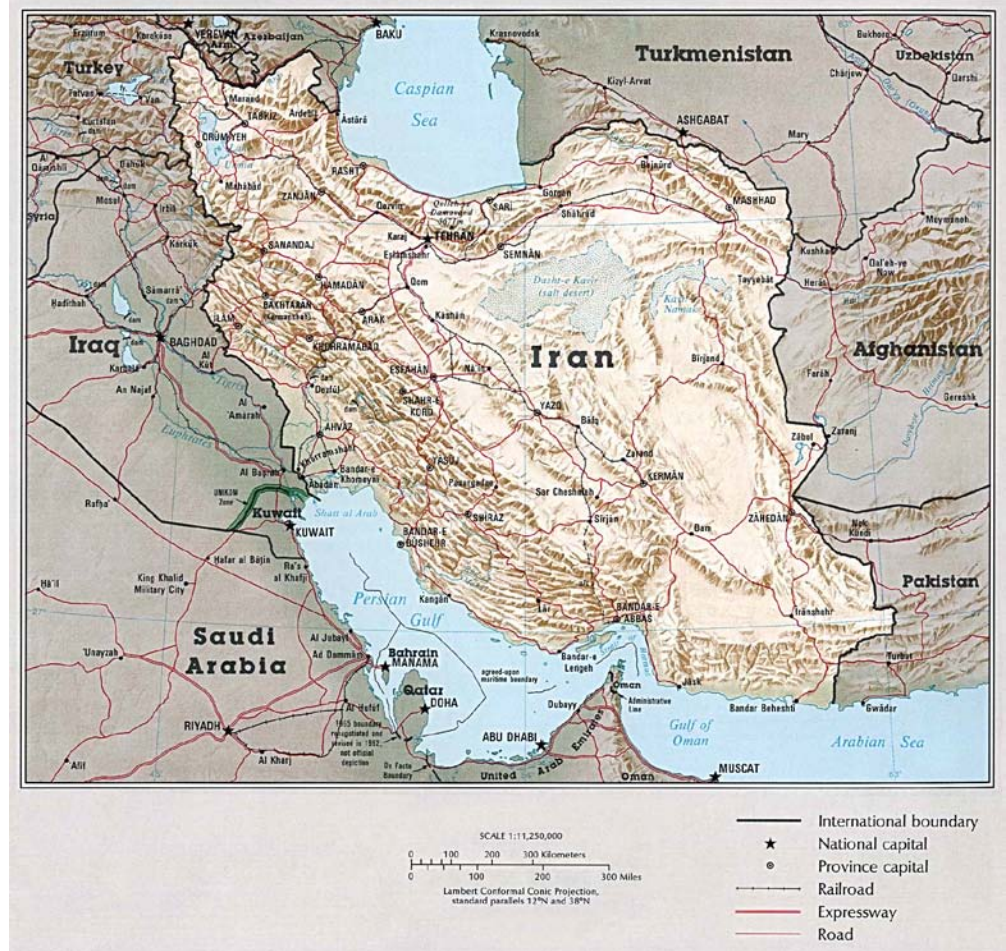
Independent Research Institutes in Physics

Our institute (IPM) •



Independent Research Institutes in Physics

Research institute for astrophysics •



History

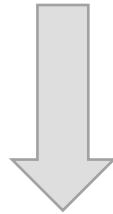


Cutting edge astronomy 700 years ago



IPM

Institute for studies in Physics and Mathematics •



Institute for research in fundamental sciences •

Early goal

Promote research •

Support research all over Iran •

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It was right after the war. Established in 1987. •

Present goal

Having a residential culture •

Increase in number of full- time researchers •

PHD program in certain topics •

Various schools at IPM

Astronomy



Cognitive Sciences



Computer Science



Mathematics



Nano-Science



Particles and Accelerators



Philosophy



Physics



Students at IPM

Affiliated by IPM •

Affiliated by other universities like Sharif •

Students at IPM

Affiliated by IPM •

Two successive year •

Affiliated by other universities like Sharif •

Students at IPM

Affiliated by IPM •

Three students each year

Affiliated by other universities like Sharif •

A good and constructive atmosphere of ●
Peer pressure ●

Junior students learn a lot from senior ones. ●

Regular weekly seminars run by students and ●
young post-docs themselves.

Courses attended first year

- Quantum field theory I ●
- Quantum field theory II ●
- General relativity ●
- Particle physics ●
- Seminar course ●

Outreach

- Educational text and audio files
- On particle physics with focus on neutrino physics
- (Extensive exercise program)
- Used from all over Iran

Other training

- International •
- and •
- national school and workshop •
- every other year •

2011

IPM school and workshop on recent developments in Particle Physics (IPP11) •
School of Physics, IPM, Tehran, Iran
4-7 September, 2011

2011

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School of Physics, IPM, Tehran, Iran
4-7 September, 2011

- **Topics covered in this meeting include**
 - **Deep inelastic scattering and parton distribution functions;**
 - **Neutrino physics;**
 - **Supersymmetry;**
 - **LHC physics;**
 - **Flavor physics.**



**IPM international school and workshop on •
Particle Physics (IPP12): Neutrino Physics
and Astrophysics**

School of Physics, IPM, Tehran, Iran
September 26-October 1, 2012

The meeting will cover various topics including: ●

- Theory of neutrino physics**
 - Neutrinos in cosmology**
 - Cosmic rays**
 - High energy neutrinos**

List of speakers and lecturers

Q. Dorosti, ANTARES Collaboration

R. Gandhi, India

A. M. Güller, OPERA Collaboration

H. Fritzschn, Germany

A. Ibarra, Technische Universität München

M. Kachelrieß, Norway

H. Khosroshahi, IPM, Iran

P. Lipari, Italy

C. Muñoz, Spain

T. Ohlsson, Sweden

S. Palomares, Valencia University, Spain

O. L. G. Peres, Brazil

A. Yu. Smirnov, Italy

F. Vissani, Italy

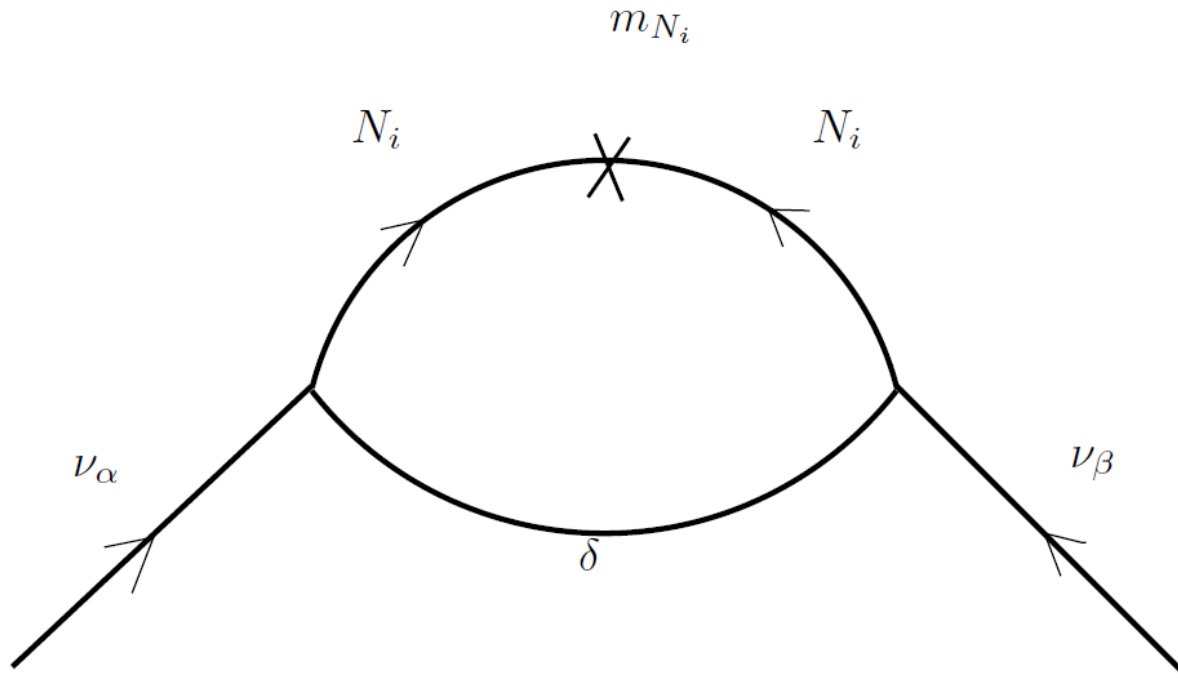
Close ties with ICTP

- I am an associate of ICTP •
- Our students attend the schools at ICTP •
- ICTP partially supports our meeting and encourages networking in the region •
(Networking with METU in Turkey) •

Topics worked on by our group

- CP-violation in neutrino mass matrix (Smirnov) •
- Exotic physics in supernova (Kusenko+Gelmini) •
- Dark matter linked to neutrino mass •
- (Boehm+Hambye+Palomares+Pascoli+Schmidt+Ma) •
- Monochromatic neutrino spectrum from DM •
- annihilation (Esmaili)
- Vector boson as DM (Rezaii)
- Electric dipole moments and CP-violation •
- Tracing CP-violation in LFV rare decays •

Dark matter linked to neutrino mass



SLIM model •

(Boehm+Hambye+Palomares+Pasc
oli+YF.)

SLIM

Light sector •

Heavy sector •

Light sector •

Supernova •

KLOE- NA62 •

Heavy sector •

Light sector ●

Supernova ●

KLOE- NA62 ●

Falsifiable ●

Heavy sector ●

Light sector •

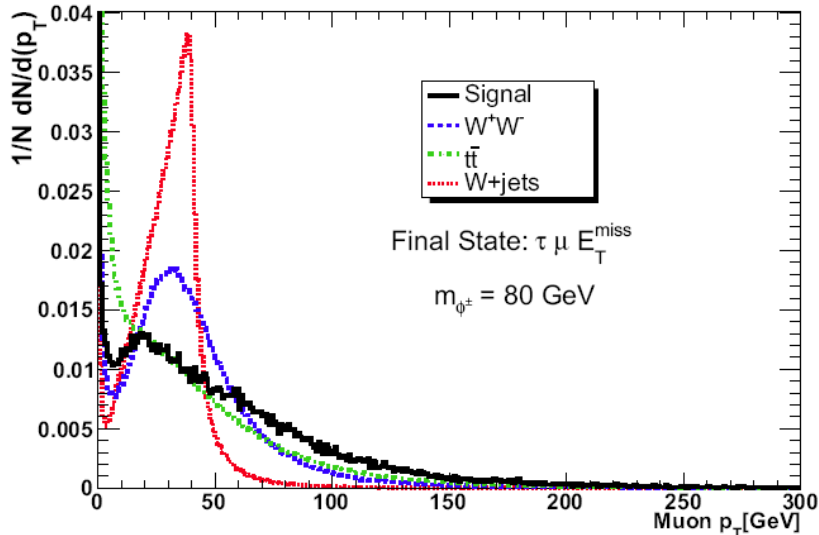
Heavy sector •

LHC •

CMS collaboration

The collaboration with them •

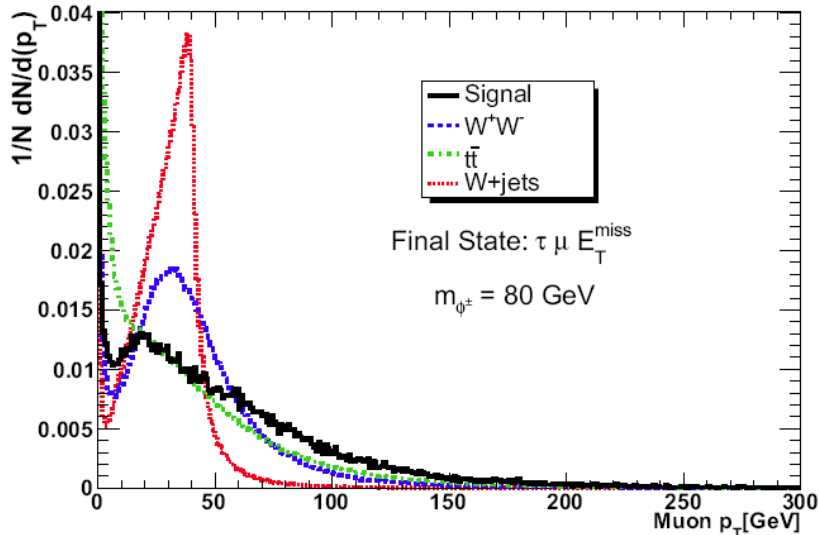
Y.Farzan and M.Hashemi, "SLIM at LHC: LHC search power for a model linking dark matter and neutrino mass,"
JHEP 1011 (2010) 029 •



CMS collaboration

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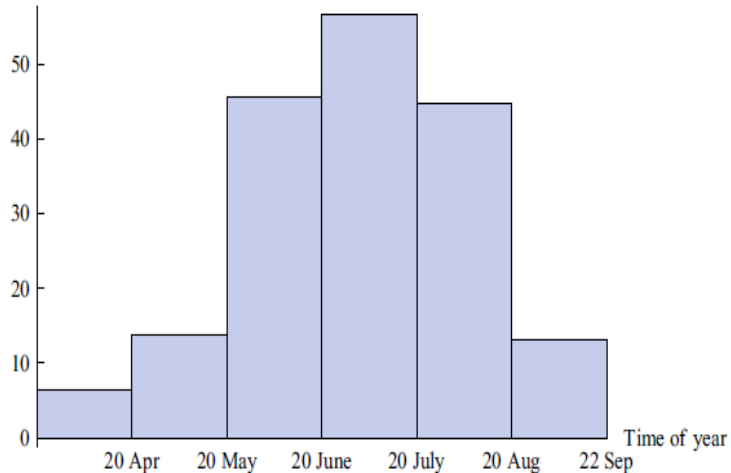


IPM is in **CMS** collaboration

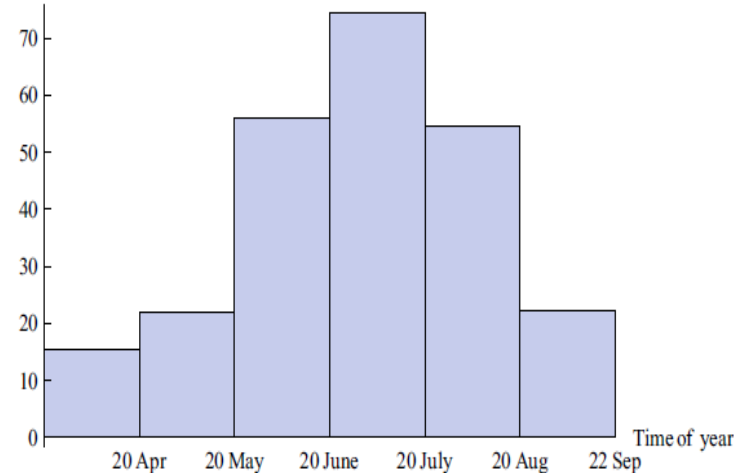
A novel method to extract information on DM from neutrino telescope

$$\text{DM} + \text{DM} \rightarrow \nu_\alpha + \nu_\beta^{(-)}$$

number of muon tracks



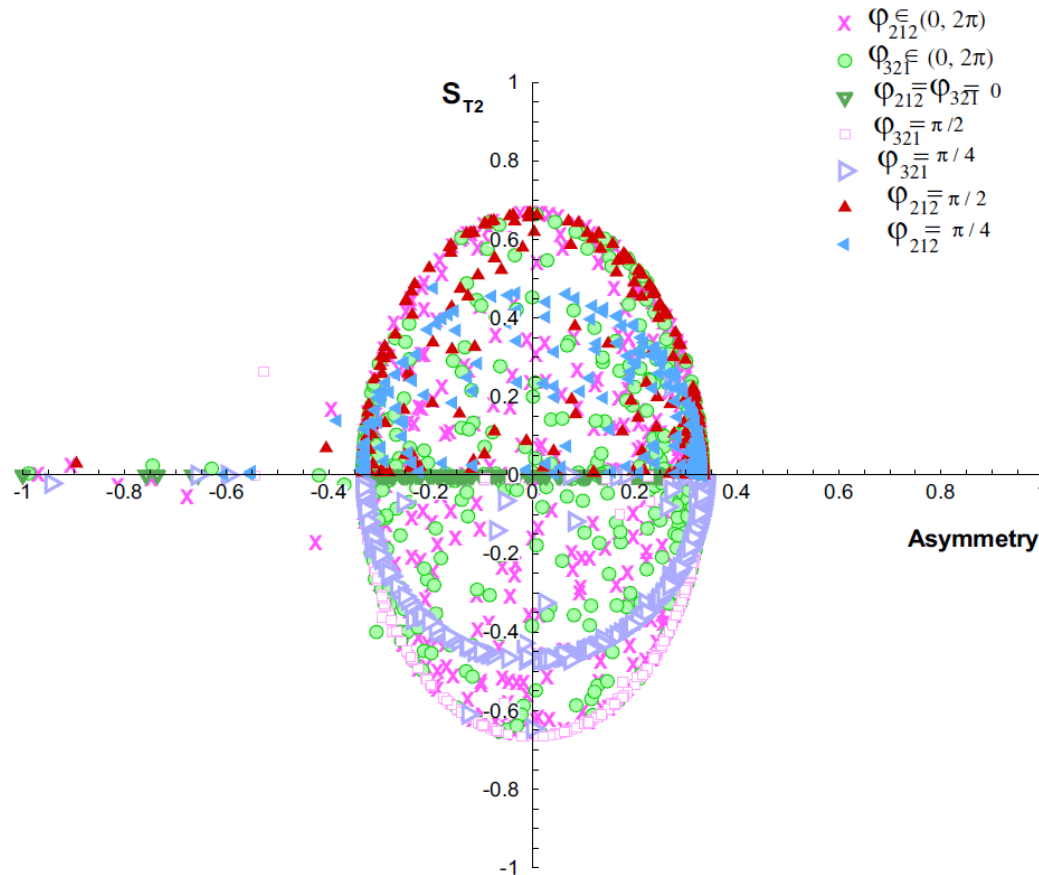
number of muon tracks



Esmaili and YF

Tracing CP-violation in rare LFV decays

Measurement of the polarization of the final particles •



Summary

After an extensive educational work , IPM is at an stage to foster a world-class environment of research for young scientists. •

We had already close collaboration with members of this network along the lines of interest of invisibles which will hopefully **grow**. •

Back up slides

Faculty Members •

Mohsen Alishahiha •

Yasaman Farzan

Mohammad Mehdi Sheikh-Jabbari

Reza Asgari •

Ali Naji •

PostDoctoral Fellows •

7 in high energy •

Part time researchers

4 in high energy

Various schools at IPM

- Astronomy ●
- Cognitive Sciences ●
- Computer Science ●
- Mathematics ●
- Nano-Science ●
- Particles and Accelerators ●
- Philosophy ●
- Physics ●

Physics school

- High energy theory ●
- High energy phenomenology ●
- Early universe cosmology ●
- Condense Matter ●
- Soft matter Biophysics ●
- Carbon lab ●

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Our group

Arman Esmaili Taklimi ●

Amin Rezaii-Akbarie ●

Two new PhD students ●

MSc students ●