Ministry of Human Resource Development
Government of India

GLOBAL INITIATIVE OF ACADEMIC NETWORKS
(GIAN)

Two week course on the study of neutrino oscillations at the accelerator experiments

The Physics Department of the Aligarh Muslim University is organizing a two week course on Neutrino Physics from the 13th November, 2017 (Monday) to 25th November, 2017 (Saturday).

Lectures by

Speaker	Lectures	Tutorials	Title
Prof. Sanjib Mishra	14	6	Neutrino Physics
Prof. S. K. Singh	2	-	Introduction to the standard model of electroweak interactions
Prof. M. Sajjad Athar	3	-	CCQE, Inelastic & deep inelastic processes: Lagrangian, Feynman diagrams, transition matrix element, cross section

A few more distinguished Neutrino Physicists in India are also expected to deliver 1 or 2 lectures during the GIAN course.

- ✓ Professor Sanjib Mishra is a M.J. Mungo Distinguished Professor at the Department of Physics & Astronomy, University of South Carolina, U. S. A.
- ➢ Before joining University of South Carolina, Prof. Mishra was faculty at the Harvard University. He is an excellent teacher and a distinguished scientist.
- ➢ He is a recipient of several prestigious awards, for example, Clark-Tozier Award, 1996, for undergraduate teaching and research; Hoops Prize, 1997, for teaching and supervising undergraduate research; M.J.Mungo Distinguished Professor, 2008; University Research Association (URA) Scholar, 2012; American Physical Society (APS) Science & Technology Forum, 2015.
- ➢ He is a member of LBNE, NOvA, MIPP, MINOS, NOMAD, SPY & CCFR Collaborations.

- ✓ Professor S. K. Singh is an Adjunct faculty at the Aligarh Muslim University. He is a Theoretical Physicist and works in the area of Nuclear and Particle Physics.

- ✓ Professor Mohammad Sajjad Athar is a faculty at the Aligarh Muslim University and works in the area of Nuclear and Particle Physics.

All lectures: 1 hr 15mts + 15mts interactive session

November 2017

Monday 13

- **Lecture #1:** Neutrinos in Particle Physics: An introduction to the most ubiquitous and the least understood `cousin' particle that make up the Universe we live in. **(Prof. Sanjib Mishra)**
- **Lecture #2:** Introduction to the Standard Model of Electroweak Interaction. **(Prof. S. K. Singh)**

Tuesday 14

- **Lecture #3:** Neutrinos in accelerator: The status of the accelerator neutrinos. **(Prof. Sanjib Mishra)**
- **Lecture #4:** Introduction to the Standard Model of Electroweak Interaction. **(Prof. S. K. Singh)**

Wednesday 15

- **Lecture #5:** Neutrinos in accelerator: The future of the accelerator neutrinos. **(Prof. Sanjib Mishra)**
- **Lecture #6:** Neutrino oscillations: Status of the neutrino oscillation; PMNS matrix and neutrino mass hierarchy; the open questions and challenges. **(Prof. Sanjib Mishra)**

Thursday 16

- **Tutorial #1:** On lectures 3 & 5
- **Lecture #7:** Neutrinos inclusive cross section: A summary of the inclusive neutrino cross section, emphasizing the dominant errors in current measurements. **(Prof. Sanjib Mishra)**
- **Lecture #8:** Neutrino-electron scattering and neutrino-nucleon scattering. **(Prof. M. Sajjad Athar)**

Friday 17

- **Lecture #9:** Neutrino flux: Neutrino species; measurements of neutrino flux; proposed experiments to measure the flux (neutrino and hadron-production experiments). **(Prof. Sanjib Mishra)**
- **Tutorial #2:** On lectures 6 & 7.

Saturday 18

- **Lecture #10:** Exclusive neutrino processes.**(Prof. Sanjib Mishra)**
- **Tutorial #3:** On lectures 8 & 9.

November 2017

Monday 20

- **Lecture #11:** The status and challenges of the neutrino induced quasielastic and resonance processes. **(Prof. Sanjib Mishra)**
- **Lecture #12:** One pion production. **(Prof. M. Sajjad Athar)**

Tuesday 21

- **Lecture #13:** Neutrinos production of the coherent mesons: The status and challenges of the neutrino induced coherent processes. **(Prof. Sanjib Mishra)**
- **Tutorial #4:** On lectures 10 & 11.

Wednesday 22

- **Lecture #14:** How to predict the neutrino spectra at the 'far' location and associated errors. **(Prof. Sanjib Mishra)**
- **Tutorial #5:** On lectures 12 & 13.

Thursday 23

- **Lecture #15:** Neutrino energy scale and prediction of neutrino spectra at the 'Far Detector'. **(Prof. Sanjib Mishra)**
- **Lecture #16:** Search for new physics using neutrinos: Select topics on windows to the new physics using neutrinos (Part-1). **(Prof. Sanjib Mishra)**

Friday 24

- **Lecture #17:** Search for new physics using neutrinos: Select topics on windows to the new physics using neutrinos(Part-2). **(Prof. Sanjib Mishra)**
- **Lecture #18:** Deep inelastic scattering. **(Prof. M. Sajjad Athar)**
- **Tutorial #6:** On lectures 14 & 15.

Saturday 25

- **Lecture #19:** Search for new physics using neutrinos: Select topics on windows to the new physics using neutrinos(Part-3). **(Prof. Sanjib Mishra)**
- ✓ **Feedback session**
- ✓ **Concluding session**

You should attend:

If you have joined a Neutrino Physics group (Experimental or Theoretical) as a Ph. D. student or a Post Doc or you have recently joined an ***Academic Institution*** as a Faculty and interested to learn about the neutrinos.

- ✓ **Registration will start from the 21st August, 2017**
  (payment will be made online)

- ✓ **Last date of Registration:** 30th September, 2017.

Registration fees:

The participation fess for taking the course are as follows:

Participants	Amount
Ph.D. student	1000 INR
M.Sc. student	500 INR
From Abroad	5000 INR
Faculty	2000 INR

- ✓ The above fees include all instructional materials, computer use for tutorials and assignments.

- ✓ The participants are required to make arrangement for their stay. However, efforts will be made to arrange limited accommodation on the nominal rates in the university campus on first-come-first-serve basis.

Mode of payment

Money may be transferred on "GIAN COURSE COORDINATOR, DEPTT OF PHYSICS".

Account number: 5247101004984

Bank: CANARA BANK

Address: CANARA BANK, ALIGARH MUSLIM UNIVERSITY, ADMINISTRATIVE BLOCK, LAL DIGGI, ALIGARH-202001.

Branch: AMU, ALIGARH

IFSC code: CNRB0005247

Branch code: Last six character of IFSC code represent branch code.

MICR code: 202015013

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