NEUTRINO PHYSICS

Moscow Institute of Physics and Technology (National Research University)

Degree or qualification is awarded: **PhD (Candidate of Science)**

Language of study: **English**
Mode of study: **full-time**
Duration: **4 years**
Availability of free education: **yes**
Price: **375 000 RUB**

Programme webpage at the university website: https://eng.mipt.ru/programs/neutrino-physics/

Programme curator: **Denis Ustyuzhaninov**
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Entry requirements:

- Master's degree / equivalent in a related field
- B2 level of English
- Good track record of publications related to the topic of the intended research
- Strong research proposal 1,500 - 3,500 words

Research supervisor:
Yury Shitov
PhD

Supervisor's research interests:

- Search for neutrino less double beta decay.
- Measurements of reactor antineutrinos.
- Search for coherent elastic neutrino scattering on nuclei (CENNS).
- Techniques of measurement of ultra-low levels of radioactive background.

Research highlights:
Our group contributes significantly to a number of world leading experiments: GERDA/LEGEND, NEMO-3 /SuperNEMO, DANSS, etc. We have many years of experience working with scientific groups from around the world – all the leading centers of neutrino physics. Financial support will be provided.
The Ph.D. student will have a unique opportunity:

- To work in international collaborations on the edge of modern physics.
- To work in advanced facilities.
- To obtain fundamental world-class results in the field of neutrino physics.
- To publish solid papers.
- To get excellent material for thesis.
- Get a brilliant start to a scientific career thanks to join work with leading physicists from around the world.

Supervisor's specific requirements:
The candidate must have a serious background in the field of computer physics. The main tasks for him will be the analysis of experimental data using modern software. Basic programming knowledge is required, algorithms, an object-oriented approach. Knowledge of Python and C ++ is highly desirable. Ideally, be familiar with the ROOT software environment (https:// root.cern.ch/), the GEANT4 simulation package (http:// geant4.web.cern.ch/). Knowledge of machine (deep) learning (ML) techniques and Big Data processing is a fantastic advantage.

Main publications:

- E. Rukhadze et al. Investigation of double beta decay of 58Ni at the Modane Underground Laboratory // J.Phys.Conf.Ser. 1342 (2020) no.1, 012041.
- R. Arnold et al. Search for the double-beta decay of 82Se to the excited states of 82Kr with NEMO-3 NEMO-3 Collaboration, arXiv:2001.06388 [physics.insdet], accepted for publication in Nuclear Physics A.
- R. Arnold et al. Detailed studies of 100Mo twoneutrino double beta decay in NEMO-3 // Eur.Phys.J. C79 (2019) no.5, 440.
- N.I. Rukhadze et al., Investigating the Double Beta Decay of 58Ni // Bull.Russ.Acad.Sci.Phys. 82 (2018) no.6, 708-711, Izv.Ross.Akad.Nauk Ser.Fiz. 82 (2018) no.6.
- R. Arnold et al. Final results on 82Se double beta decay to the ground state of 82Kr from the NEMO-3 experiment Eur.Phys.J. C78 (2018) no.10, 821.

Specializations within this programme