SCIENTIFIC SOFTWARE AND DATA ANALYSIS IN NON-ACCELERATOR PARTICLE 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 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:
Alexander Nozik
PhD

Supervisor's research interests:
Current primary focus of the research is the development of a new generation of scientific software for particle physics and beyond. In the near future, we intend to work on data acquisition and control systems as well as parallel and distributed tools for Monte-Carlo simulations. Also, we continue our work in Troitsk nu-mass and IAXO collaboration as well as BAT collaboration.

Research highlights:
All scientists use software in their work:
data acquisition, storage and analysis as well as simulations and device control. Everything relies on a software, yet there are only several groups in the world, who work on a development of new approaches to the software development for science. Our group works closely with JetBrains company and is a part of JetBrains Research foundation. Currently we work primarily in Kotlin language. We are also members of several international collaborations (Troitsk nu-mass, TRISTAN, IAXO, BM@N, BAT).

Supervisor's specific requirements:

- Capable to work independently.
- Motivation to work hard, learn and improve skills.
- Knowledge of application development in any programming language and motivation AND / OR A background in particle physics AND /OR A background and mathematical statistics.

Main publications:

- Kotlin language for science and Kmath library (https://dx.doi.org/10.1063/1.5130103).
- Statistical time analysis for regular events with high count rate (https://dx.doi.org/10.1088/1748-0221/14/06/P06008).
- Physics potential of the International Axion Observatory (IAXO) (https://dx.doi.org/10.1088/1475-7516/2019/06/047).

- A white paper on keV sterile neutrino dark matter (https://dx.doi.org/10.1088/1475-7516/2017/01/025).
- Upper limit on the electron antineutrino mass from the Troitsk experiment (https://dx.doi.org/10.1103/PhysRevD.84.112003).

Specializations within this programme