THEORY OF WAVE PROCESSES IN SPACE PLASMA

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/theory-of-wave-processes-in-space-plasma/

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:
David Shklyar
PhD, DSc

Supervisor's research interests:

- Wave propagation in the magnetosphere and ionosphere.
- Wave-particle interactions in the Earth's radiation belts.
- Analysis and interpretation of satellite data on energetic particle fluxes and multicomponent wave measurements.

Research highlights:
The research is performed in collaboration with colleagues from various Russian scientific-research institutes, as well as with researches from Czech Republic and France. The research is based on satellite data available on Internet. Limited support from Russian Foundation for Basic Research might be possible.

Supervisor's specific requirements:
Mastery of the following courses is required:

- Mechanics.
- Classical theory of field.
- Electrodynamics of condensed media.
- Basics of plasma physics.
- Basics of MATLAB.

Main publications:

- D.R. Shklyar (2011), Wave-particle interactions in marginally unstable plasma as a means of energy transfer between energetic particle populations. Physics Letters A 375 1583-1587.
- Shklyar D. R., and I. V. Kuzichev (2014), Ion energization by ELF wave packets formed of lightning-induced

emission in the low-altitude magnetosphere, Geophys. Res. Lett., 41, DOI:10.1002/2013GL058692.
- Vavilov, D. I., and D. R. Shklyar (2014), Ionospherically reflected proton whistlers, J. Geophys. Res. Space Physics, 119, 99789991, DOI:10.1002/2014JA020510.
- Shklyar, D. R. (2017), Energy transfer from lower energy to higher-energy electrons mediated by whistler waves in the radiation belts, J. Geophys. Res. Space Physics, 122, 640-655, DOI:10.1002/2016JA023263.
- D.R. Shklyar, S.A. Prokhorenko (2020), Reflection from the ionosphere and exit to the ground of whistler wave packets: A dynamical model // Journal of Atmospheric and Solar-Terrestrial Physics. Vol. 201. P. 1-11. https://doi.org/10.1016/j.jastp.2020.105222

Specializations within this programme