SUPER CONFORMAL INDICES, SEIBERG DUALITIES AND SPECIAL FUNCTIONS

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/superconformal-indices-seiberg-dualities-and-special-functions/

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:
Vyacheslav Spiridonov
PhD, DSc

Supervisor's research interests:
Theory of modern special functions emerging in exact computations of partition functions in 2, 3, 4, 5, 6 dimensional supersymmetric field theories, corresponding super conformal indices and Seiberg dualities. Exactly solvable 2d lattice models of Ising type, 2d conformal field theories, star-triangle relation and Yang-Baxter equation. Theory of elliptic hypergeometric functions and elliptic integrable systems.

Research highlights:
The research requires mathematically minded approach in the Dirac style: physics suggests the mathematical objects for investigation, and exact formulas derived via mathematical logic help to understand the physics behind. Successful students may get additional financial support from research grants.

Supervisor's specific requirements:

- Knowledge of quantum mechanics, basic quantum field theory and statistical mechanics.
- Knowledge of supersymmetry and gauge field theory (with the corresponding group-theoretical background).
- Ability to use Latex, Mapple or Mathematica.
- Sufficient knowledge of real and complex analysis.

Main publications:

- V.P. Spiridonov, G.S. Vartanov, Elliptic hypergeometry of supersymmetric dualities, Commun. Math. Phys. 304 (2011) 797.
- S.E. Derkachov, V.P. Spiridonov, Yang-Baxter equation, parameter permutations, and the elliptic beta integral, Russian Math. Surveys 68 (2013) 1027.
- V.P. Spiridonov, Essays on the theory of elliptic hypergeometric functions, Russian Math. Surveys 63 (2008)

405.
- V.P. Spiridonov, Universal superpositions of coherent states and self-similar potentials, Phys. Rev. A 52 (1995) 1909.
- G.A. Sarkissian, V.P. Spiridonov, The endless beta integrals, arXiv:2005.01059 [math-ph].

Specializations within this programme