# 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