DEVELOPMENT AND APPLICATION OF BIGDATA ANALYSIS SYSTEMS FOR STUDIES OF QUARK-GLUON MATTER PROPERTIES IN HEAVY-ION COLLISIONS

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/development-and-application-of-bigdata-analysis-systems-for-studies-of-quark-gluon-matter-properties/

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:
Dmitry Blau
PhD

Supervisor's research interests:
Study of quark-gluon matter properties in heavy-ion collisions at accelerator facilities, such as LHC (CERN), RHIC (USA), FAIR (Germany), and NICA (Russia). In particular, studies of photons and neutral mesons at ALICE experiment at LHC by analysis of data acquired since the beginning of the data taking (in 2009), detector upgrade, preparation of software for data taking, reconstruction and simulations for future measurements. For future experiment CBM at FAIR, simulations and new methods development are performed for collective flow studies. For future experiment MPD at NICA, simulations of direct photons and performance studies are carried out.

Research highlights:
Research program is devoted for a broad spectra of topics, which are connected to studies of strong-interacting matter, and thus, the possibility is provided to cover all up-to-date research areas of interest in the world. The unique photon spectrometer of ALICE experiment is the largest contribution of Russian Federation to the ALICE experiment (more than 6 million Swiss francs), at the moment this detector is under upgrade for the future data taking periods. Research is carried out with tight collaboration with world scientific centers – CERN (Switzerland), GSI (Germany), JINR (Russia), NRC "Kurchatov Institute" (Russia). Currently scientific supervisor (Blau D.S.) is a leader of RSCF grant project dedicated to the same topic.

Supervisor's specific requirements:

- Nuclear physics, physics of elementary particles.
- Programming (C++, ROOT).
- Methods of statistical analysis of data.

Main publications:

- Blau D. “Performance of the ALICE electromagnetic calorimeters in LHC Runs 1 and 2 and upgrade projects”, Journal of Instrumentation 15 (2020) C03025.
- Blau D. “Calibration of the ALICE PHOS calorimeter”, Journal of Physics: Conference Series 1390 (2019) 012113.
- Blau D. et. al, “Performance studies for collective flow measurements with CBM at FAIR”, J. Phys.: Conf. Ser. 1390 012027 (2019).
- Blau D. “Direct photon production in pp, p-Pb and Pb-Pb collisions: results from ALICE”, EPJ Web of Conferences 222, 02001 (2019).
- Blau D., Acharaya S. et al. (ALICE Collaboration), “Direct photon elliptic flow in Pb–Pb collisions at Research supervisor: Dmitry Blau PhD √sNN = 2.76 TeV” TeV”, Physics Letters B 789 (2019) 308-322.
- Blau D. “π0-hadron correlations in pp, p-Pb and Pb-Pb collisions at ALICE”, Journal of Physics: Conference Series 798 1 (2017) 012052. DOI: 10.1088/1742-6596/798/1/012052
- Blau D, Ablyazimov T et al. (CBM Collaboration) “Challenges in QCD matter physics -The scientific programme of the Compressed Baryonic Matter experiment at FAIR”, Eur. Phys. J. A (2017) 53: 60.
- Blau D, Adare A et al. (PHENIX Collaboration) “Azimuthally anisotropic emission of lowmomentum direct photons in Au + Au collisions at √sNN = 200 GeV”, Physical Review C – Nuclear Physics (2016) 94 (6), 064901.
- Blau D, Adam J et al. (ALICE Collaboration) “Direct photon production in Pb-Pb collisions at √sNN = 2.76 TeV”, Physics Letters B 754 (2016) pp. 235-248.
- Blau D, Abelev B et al. (ALICE Collaboration) “Neutral pion production at midrapidity in pp and Pb–Pb collisions at √sNN = 2.76 TeV”, European Physical Journal C (2014) 74 (10), 3108, pp. 1-20.
- Blau D, Abelev B et al. (ALICE Collaboration) “Neutral pion and η meson production in proton-proton collisions at √s = 0.9 TeV and √s = 7 TeV”, Physics Letters B (2012) 717 (1-3), pp. 162-172.

Specializations within this programme