

SPD Range System Prototype Geometry Modeling

Currently, a mega-science project is being implemented at JINR — the NICA (Nuclotron-based Ion Collider fAcility) accelerator complex. Several large experiments are being implemented on the NICA complex, in particular, the SPD (Spin Physics Detector) detector is designed to conduct spin physics studies in collisions of proton and ion beams.

One of the key detector systems of the SPD setup is the Range System, designed to identify muons in a wide energy range.

An important stage in preparing the experiment is the description of the setup, modeling and processing of model data.

As part of the project, the student will gain an understanding of the design of experimental setups in high-energy physics.

The student will study the ROOT geometry package - tool for building, browsing, navigating and visualizing detector geometries..

Using the engineering model, the student will build a geometric model of the Range System Prototype of the SPD experiment, integrate the resulting model into the SpdRoot framework and generate model data.

General work plan:

- Study of the ROOT geometry package and the basics of the SpdRoot framework.
- Code of the SPD Range System Prototype geometric model.
- Integration of the model into SpdRoot framework.
- Modeling of data samples.
- Presenting of the results of work as a presentation.

Requirements for the student's level of training: Knowledge of programming languages C++, ROOT, basics of Linux OS.

Recommended literature:

- ROOT User's Guide, <https://root.cern/primer/>
- Technical Design Report of the Spin Physics Detector at NICA, <https://arxiv.org/abs/2404.08317>

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