

Polytechnics create elements of the data acquisition system for the SPD experiment at the NICA collider

SPbPU employees are developing elements of the data acquisition system for the SPD experiment at the NICA collider, which will allow synchronizing events of the collider and particle detectors with subnanosecond accuracy, which will ensure the possibility of reconstructing events during beam collisions at the NICA collider. The NICA (Nuclotron-based Ion Collider fAcility) accelerator complex is one of six MegaScience-class projects in Russia under construction at the Joint Institute for Nuclear Research (JINR) in Dubna. The Superconducting Proton and Heavy Ion Collider is an international megaproject.



The collisions of heavy ion beams will investigate critical states of nuclear matter in extreme conditions that arose after the Big Bang at the early stages of the Universe's evolution. Critical states of nuclear matter are recreated in laboratory conditions by accelerating and colliding high-intensity beams of heavy ions in a collider. These processes will be studied at the MPD (Multi-Purpose Detector) facility.

In the interaction of polarized proton and deuteron beams at the SPD (Spin Physics Detector) facility at the NICA collider, the spin structure of nucleons will

be studied.

For high-precision synchronization of the collider and the SPD experiment data acquisition system, engineers from the Industrial Systems for Stream Data Processing laboratory of the Advanced Engineering School (AES) Digital Engineering at SPbPU have been developing subsystems since 2020 that make it possible to link the moment of beam collision time within the SPD facility to the moment when the detectors register the changed particle characteristics with sub-nanosecond accuracy.

Highly accurate binding of collider event times (collision moment) and facility event times (registration of particle characteristics) is one of the key factors in the accuracy of data collection for studying the spin structure of nucleons. The team of the SPbPU NSPOD NSP laboratory is part of the Polytechnic University's scientific group, which has been officially collaborating with JINR since 2018. The group is based on the scientific team of the Graduate School of Fundamental Physical Research of the SPbPU Institute of Physics and Mechanics under the leadership of Prof. Yaroslav Berdnikov. [SPbPU scientists participate](#) in experiments at the two main collider facilities — MPD (Multi-Purpose Detector) and SPD (Spin Physics Detector)

Дата публикации: 2023.10.12

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