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Data processing of FARICH prototype tests on ”Electron beam facility” from VEPP-4M complex

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The SPD experiment for the NICA collider (JINR, Dubna) is currently under development. Its goal is to study the spin structure of nucleons in collisions with momenta up to 27 GeV/c. Preliminary estimates indicate that in the end-cap section of the detector, the momenta of π and K mesons can reach up to 6 GeV/c. For efficient particle identification with a confidence level better than 3σ, a Cherenkov ring imaging detector system based on focusing aerogel (FARICH) is proposed.
The FARICH system is being developed at the Budker Institute of Nuclear Physics (BINP, SB RAS) in collaboration with the Institute of Catalysis SB RAS. In the spring of 2024, the Institute of Catalysis synthesized new aerogel samples, including multilayer monoblocks with a refractive index below 1.04 (for the SPD experiment) and ultra-light samples with a refractive index below 1.008.
A prototype FARICH detector, assembled using these new radiators, was tested on the electron beam of the VEPP-4M complex. This paper presents the results of testing the prototype with the new aerogel samples, describes the data processing from the experiment, and outlines future plans for the prototype's development.

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