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Fast FARICH Simulation Using Generative Adversarial Networks

In the end-cap region of the SPD detector complex, particle identification will be provided by a Focusing Aerogel RICH detector (FARICH). FARICH will primarily aid with pion / kaon separation in final open charmonia states (momenta below 5 GeV/c). A free-running (triggerless) data acquisition pipeline to be employed in the SPD results in a high data rate necessitating new approaches to event generation and simulation of detector responses. Several machine learning based approaches are described here, generating high-level reconstruction observables as well as full Cherenkov rings using a generative neural network. The fast simulation is trained using Monte-Carlo simulated data samples. We compare different approaches and demonstrate that they produce high-fidelity samples.

Significance

Our previous results for this project cover FARICH reconstruction and particle identification. Although it provided a foundation that proved useful later, the submitted abstract concerns a different task of FARICH simulation, therefore, novel methods had to be developed

References

https://link.springer.com/article/10.3103/S0027134924702369

Experiment context, if any

https://spd.jinr.ru/

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