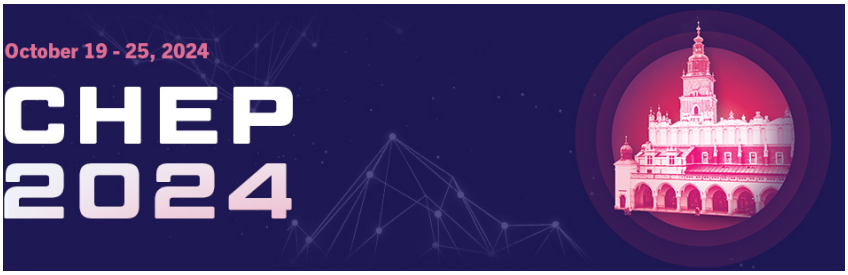

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Zero Degree Calorimeter fast simulation with normalizing flows

Thursday 24 October 2024 16:00 (15 minutes)

Simulating the Large Hadron Collider detectors, particularly the Zero Degree Calorimeter (ZDC) of the ALICE experiment, is computationally expensive. This process uses the Monte Carlo approach, which demands significant computational resources, and involves many steps. However, recent advances in generative deep learning architectures present promising methods for speeding up these simulations.

In this work, we apply normalizing flows to the simulation of ZDC neutron detector responses, thus obtaining high-fidelity surrogates of numerical models, and achieving competitive results on the GEANT4 dataset. We also provide and compare post-processing techniques for enhancing the results. Moreover, we check if the reasoning of the networks is physically relevant by employing state-of-the-art explainability techniques. This we see as a vital step in deciding whether our model is ready to replace the current simulation engine.

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