Contribution ID: **707** Type: **Parallel session talk**

Fast Simulation of Highly Granular Calorimeters with Generative Models: Towards a First Physics Application

Tuesday 22 August 2023 09:50 (20 minutes)

While simulation plays a crucial role in high energy physics, it also consumes a significant fraction of the available computational resources, with these computing pressures being set to increase drastically for the upcoming high luminosity phase of the LHC and for future colliders. At the same time, the significantly higher granularity present in future detectors increases the physical accuracy required of a surrogate simulator. Machine learning methods based on deep generative models hold promise to provide a computationally efficient solution, while retaining a high degree of physical fidelity.
Significant strides have already been taken towards developing these models for the generation of particle showers in highly granular calorimeters, the subdetector which constitutes the most computationally intensive part of a detector simulation. However, to apply these models to a general detector simulation, methods must be developed to cope with particles incident at various points and under varying angles in the detector. This contribution will address steps taken to tackle the challenges faced when applying these simulators in more general scenarios, as well as the effects on physics observables after interfacing with reconstruction algorithms. In particular, results achieved with bounded information bottleneck and normalising flow architectures based on regular grid geometries will be discussed. Combined with progress on integrating these surrogate simulators into existing full simulation chains, these developments bring an application to benchmark physics analyses closer.

Collaboration / Activity

ILD / Generic R&D

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Session Classification: T12 Detector R&D and Data Handling

Track Classification: Detector R&D and Data Handling