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General shower simulation MetaHEP in key4hep framework

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Description of development of cascades of particles in a calorimeter of a high energy physics experiment relies on precise simulation of particle interactions with matter. It is inherently slow and constitutes a challenge for HEP experiments. Furthermore, with the upcoming high luminosity upgrade of the Large Hadron Collider and a much increased data production rate, the amount of required simulated events will increase accordingly. Several research directions investigated the use of Machine Learning (ML) based models to accelerate particular calorimeter response simulation. These models typically require a large amount of data and time for training, and the result is a specifically tuned simulation. Meanwhile, meta-learning has emerged in ML community as a fast learning algorithm using small training datasets. In this contribution, we present MetaHEP, a meta-learning approach to accelerate shower simulation in different calorimeters using very high granular data. We show its application using a calorimeter proposed for the Future Circular Collider (FCC-ee) and integration into key4hep framework.

Significance

References

Experiment context, if any

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Session Classification: Poster session with coffee break

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