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Track finding and fitting with differentiable programming

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The injection of physics principles for training machine learning algorithms is an active area of research and development within the particle physics community. In this contribution we present a novel methodology, based on differentiable programming tools, for pattern recognition and track fitting in muon chambers with high noise rates.

The developed architecture centers around transformers for assessing the probability of a hit to pertain to a muon track. Concurrently, throughout the training's minimization iterations, a differentiable track fit is executed, precisely constraining the selected hits onto a helical trajectory.

We showcase the dual impact of this approach, not only enhancing the model's performance but also contributing to the network's broader generalization.

Brainstorming idea [title]

Track finding and fitting with differentiable programming

Brainstorming idea [abstract]

Differentiable programming is nowadays supported in modern libraries. Based on the presented contribution, we propose to brainstorm on its impact on the pattern recognition and track fitting tasks typical of HEP experiments.

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