

## Fourth MODE Workshop on Differentiable Programming for Experiment Design



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# Toward Particle ID in Granular Hadron Calorimeters

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High granularity has become a desirable feature in hadron calorimeters after the parallel realizations that 1) the hadronic decay of boosted heavy particles could be successfully identified within fat jets, and 2) that particle flow techniques relying on detailed structure of the hadronic showers are an invaluable technique for event reconstruction. In this work we study if arbitrarily high granularity may also allow for a discrimination of the identity of hadrons of different kinds as generators of the observed showers. Using Geant4 we simulate a million-cell calorimeter module and seek discrimination of protons from charged pions and kaons. In our preliminary results we obtain significant discrimination power by analyzing detailed features of the topology of the energy deposition.

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