

## Fourth MODE Workshop on Differentiable Programming for Experiment Design



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### Stable neural network models for calorimeter optimization

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The rapid development of ML and AI applications requires training a large number of models. One of the ways to organize training of them is the automated machine learning (AutoML) approach, where there is no human control over the training result. A crucial prerequisite for AutoML is the stability of the training model incorporated within it. This study presents an approach to identifying the training model of artificial neural networks, which achieves a specified convergence of the solution. The impact of sampling the training data and the initialization of the model weights are considered. The proposed model selection method extends conventional hyperparameter search approaches by identifying a stable model that meets a specified stability criterion. The results of this approach are shown for the optimization of an electromagnetic calorimeter.

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