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LHCb ECAL optimization

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LHCb ECAL optimization is a good use case for the generic problem of comprehensive optimization of the complex physics detector. Pipeline-based approach for LHCb ECAL optimization is established and used to scan parameter space for desired subspace which met needs of the LHCb experiment. Parameters for the calorimeter optimization include technology, granularity, Moliere Radius, timing resolution for calorimetric modules, and modules distribution in the ECAL area. Physics significance of a selected channel vs. cost of the detector can be seen as an performance metric of the detector optimization. Assuming differentiable surrogate implementation, the pipeline-based approach is able to speed up the optimization cycle w.r.t. black-box optimization. The latest improvements in the pipeline-based approach and its ability to determine the necessary degree of detail of a simulation are discussed.

Author: BOLDYREV, Alexey (NRU Higher School of Economics (Moscow, Russia))

Presenter: BOLDYREV, Alexey (NRU Higher School of Economics (Moscow, Russia))

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