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Machine Learning applications for collider luminosity maximization

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The luminosity of a collider can be affected by many parameters at the same time. It is not easy to distinguish the effects of one parameter from all other parameters separately. Therefore, optimizing the performance of a collider such as RHIC, EIC becomes a multi-objective optimization problem with possible noisy signals and involves many parameters. Therefore, machine learning (Bayesian and Gaussian Process) could be a good tool for the luminosity optimization. Here, we talk about a Bayesian optimization method which is developed at LBNL GPTune and its planned application to RHIC luminosity optimization, as well as its possible application to EIC collider.

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