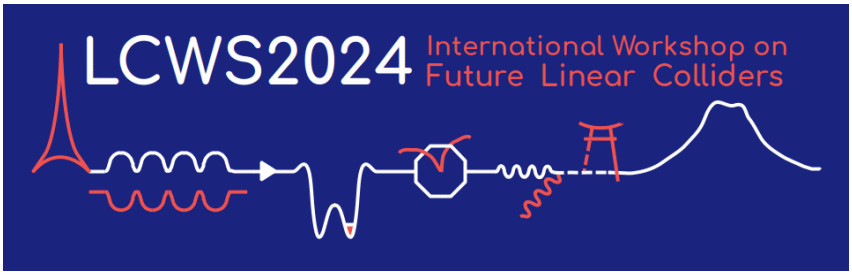

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Design of the ILC electron-driven positron source and utilization of black-box optimization

Wednesday 10 July 2024 11:20 (20 minutes)

The International Linear Collider (ILC) represents the next generation of electron-positron colliders, designed to operate at center-of-mass energies ranging from 250 GeV, with plans to extend up to 1 TeV in the future. This opens up a broad spectrum of possibilities for exploring physics beyond the Standard Model. The ILC requires advanced engineering technology and meticulous design to generate large quantities of positrons. In the design of the ILC electron-driven positron source, simulation tools such as Geant4, GPT, and SAD are employed. In a significant shift from the previous human-intensive, step-by-step optimization procedures, we have now embraced black-box optimization methods, including Bayesian optimization, to streamline and enhance the parameter optimization of the positron source accelerator system. This methodological evolution has not only boosted efficiency but also redirected more resources towards further design improvements. By incorporating machine learning techniques from the initial stages of accelerator design, we anticipate the development of accelerators that are not only more efficient but also significantly more precise. Here, we present the current status of the ILC electron-driven positron source and its design methodology.

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