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## Progress towards evaluating different types of colliding beams for a future wakefield-based 10 TeV discovery collider

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The 2023 P5 report and recent long-term planning efforts in high-energy physics emphasize the need for a future discovery collider operating at 10 TeV parton center-of-momentum (pCM). A promising candidate is a wakefield-based linear collider, offering various beam options. While conventional electron-positron collisions using flat beams are preferred, challenges with accelerating such beams in wakefield accelerators have led to exploring alternatives like round beams, electron-electron collisions, and gamma-gamma collisions.

To evaluate these alternatives, we introduce a modeling framework that assesses their discovery potential. This framework includes detailed simulations of beam dynamics during collisions, accounting for disruption and beamstrahlung effects, to calculate luminosity and particle densities. Geant-4 simulations evaluate detector backgrounds and inform realistic detector designs, enabling studies of physics benchmarks to estimate discovery potential.

We present preliminary results for different collision scenarios, highlight the framework's current limitations, and propose future improvements.

### Footnotes

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