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Gauging the impact of IP beam-beam fields on the physics program of future linear colliders

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Interaction point (IP) beam parameters at future linear colliders have been chosen in order to limit the impact of non-linear effects from strong electromagnetic fields at the IP. However the field strength experienced by incoming particles is still a significant percentage of the field strength that polarises the vacuum. These vacuum changes can be taken into account at Lagrangian level via the Furry picture. Until now, Furry picture calculations have been limited to first order processes, namely the beamstrahlung and coherent pair production. However there is a need, especially for precision physics requirements, to extend the analysis to higher order processes. I survey the theoretical efforts underway to apply this strong field analysis to collider processes in general, including new particle wavefunctions in overlapping bunch fields, recalculations of physics cross-sections, a new strong field event generator and proposed strong-field experimental tests in the extraction line of a future linear collider.

Summary

Primary author(s) : Dr. HARTIN, Anthony (DESY)

Presenter(s) : Dr. HARTIN, Anthony (DESY)

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