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New Physics contamination in precision luminosity measurements at future colliders

The experiments under consideration for high-energy electron-positron colliders offer a promising environment for future discoveries, by improving the current bounds on New Physics beyond the Standard Model of particle physics by several orders of magnitude.

In order to carry out reliable high precision measurements, a key quantity, the collider luminosity, has to be known and theoretically calculable with unprecedented precision. In addition, it should be independent of any possible contamination from unknown New Physics. This can be achieved through the measurement of standard candle processes.
For future electron-positron colliders, the reference process of main interest is small-angle Bhabha scattering, which is by far dominated by the electromagnetic interaction.

We quantify New Physics effects to the small-angle Bhabha process at next-generation accelerators and we discuss possible strategies to remove potential uncertainties coming from such contaminations. Moreover, we investigate such effects also in diphoton production, a proposed alternative luminosity process.

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