Beitrag ID: **23** Typ: **Contributed talk**

Investigating the Appropriateness of a Shorter Period of a Non-ideal Helical Undulator for the ILC-250 Stage

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The helical undulator-based positron source is taken into consideration for the International Linear Collider (ILC) baseline design. A multi-MeV circularly polarized photon beam is generated by passing a multi-GeV electron beam via a long superconducting helical undulator. We then direct the photon beam to a thin rotating target, which creates an electron-positron (e-e+) pair with longitudinal polarization. An Optical Matching device (OMD) captures the polarized positron beam before sending it to the Interaction Point (IP). The ILC will initially operate at 250 GeV Centre-of-mass energy (ILC-250) before upgrading to 350 GeV (ILC-350) and 500 GeV (ILC-500) GeV, as well as higher options. Each stage's goal is to probe fundamental questions in particle physics with unprecedented precision. The photon source, which generates a high-energy photon beam using helical undulators, is one of the essential parts of the ILC. Each undulator parameter affects the produced photon spectrum, which in turn affects the created positron beam. This study examines the potential benefits and drawbacks of using a shorter undulator period for the ILC-250 option. A shorter undulator period means a shorter total undulator length. As a result, synchrotron radiation deposited less power at the superconducting undulator wall. Furthermore, we anticipate that a shorter undulator period will boost photon energy and beam brightness, both of which are critical for positron production. However, this improvement comes with significant technical challenges, such as the need for stronger magnetic fields and the design and fabrication of magnets. Our research looks at whether it is possible to use a shorter undulator period for the non-ideal ILC-250 option, considering the fact that the ILC-250 needs a certain number of positrons. For the ILC-250 option, we conducted detailed simulations to assess the impact of a shorter period of non-ideal helical undulators on the photon beam spectrum.

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