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(I) Measurement of Beam Polarization at an e^+e^- B-Factory with New Tau Polarimetry Technique

Tuesday, 7 June 2022 13:15 (15 minutes)

A polarized electron beam is being considered as an upgrade for the SuperKEKB accelerator, which would enable a new precision electroweak physics program at Belle II. Many of these electroweak tests are preformed with experimental measurements of the left-right asymmetry, A_{LR}, where the expected level of precision at Belle II dictates at least one loop calculations from theory. We have tested the level of agreement in NLO calculations of A_{LR} for Bhabhas, against a Monte Carlo generation of the asymmetry with the new ReneSANCe generator. For future experimental measurements of A_{LR} the expected limiting uncertainty is the average beam polarization. A new technique, Tau Polarimetry, has been shown to be capable of measuring the average beam polarization to better than half a percent. This has been implemented at the *BABAR* experiment, a precursor experiment to Belle II, and the average beam polarization of it's associated accelerator, PEP-II, precisely measured. This presentation will present the technique, including its systematic uncertainties, using the full *BABAR* $\Upsilon(4S)$ dataset.

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