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Simulation of the Belle II beam-induced background at the SuperKEKB collider[1] ANDRII NATOCHII, University of Hawaii, BELLE II BEAM BACKGROUND GROUP TEAM — At high-energy colliders, backgrounds due to losses of beam particles can lead to a number of detrimental effects, including degradation of data quality, reduction in data-taking efficiency, superconducting magnet quenches, and damage to sensitive detectors. We review the recently improved simulation of beam backgrounds in the Belle II experiment at the SuperKEKB electron-positron collider. The unprecedented instantaneous design luminosity of $8\text{x}10^{35}$ $\text{cm}^{-2}\text{s}^{-1}$ implies a crucial need for background control and mitigation. We present updated results for SuperKEKB backgrounds using an improved multi-turn particle tracking code based on the Strategic Accelerator Design software framework. The simulation now includes more realistic collimator shapes, particle scattering off of collimators, and a more CPU-efficient collimator optimisation. These improvements have led to greatly improved agreement between simulated and experimental background rates for the aperture scans of collimators. For the first time since the start of collider commissioning, all simulated background components are within an order of magnitude of measurements. The new simulation framework is used extensively at KEK for further collider optimisation and background mitigation towards higher luminosities.

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Andrii Natochii
University of Hawaii

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