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Beam-Induced Background Simulation Studies for the Cool Copper Collider

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Beam-beam interactions constitute an important source of beam-induced background (BIB) at any e^+e^- collider, with implications for the design and optimization of detectors at these machines and, ultimately, their physics reach. In this talk, we will present the status of BIB simulations for the Cool Copper Collider (C^3). We will report results for the simulation of incoherent e^+e^- pair production, hadron photoproduction and halo muon production from interactions with collimator material, and discuss technical challenges with these simulations relevant for any e^+e^- machine. Using full detector simulation for the SiD detector concept and utilizing the Key4hep framework, we assess the impact of these backgrounds on the occupancy of the various sub-detector systems, most notably the vertex detector, and evaluate the effects of variations in the bunch time-structure of the beams. Finally, we will report the technical progress towards a full, out-of-time pileup mixing procedure of these backgrounds with hard-scatter events using well-established iLCSoft tools. We will conclude by discussing the compatibility of the C^3 beam configuration with ILC-like detectors, as well as lessons learned in the process that are useful for background simulation and detector studies at future e^+e^- colliders.

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