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Performance study of SCECAL and 6 inch silicon sensors

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The physics research and feasibility of the next-generation Electron-Positron collider is currently under investigation, with the goal of precise measurement of the Higgs boson, the W and Z bosons as well as the top quark. The electromagnetic calorimeter (ECAL) in the barrel and endcaps enhances the detector system ‘s capabilities for jet measurements—-improves jet energy resolution and augments the capabilities to measure high momentum photons and electrons. We present a new design of crystal electromagnetic calorimeter, stereo crystal electromagnetic calorimeter (SCECAL), in which long trapezoidal crystals are the basic unit composing the SCECAL. By rotating a specific angle, a certain number of unit crystals can form a cylindrical detector. This novel design has several advantages: good energy resolution while keeping the mechanical structure relatively simple, uniform along Z, φ direction, and 2D readout in Z-φ plane with 3D positioning capability. A simulation model is established and the first results of the performance studies with the SCECAL design using CEPCSW are presented, including the energy resolution, position resolution, and the separation power of close-by particles. Additionally, we are actively preparing for the development of 6-inch silicon sensors for calorimeters produced in China. The aforementioned information will be introduced in this report.

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