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Design and performance of the calorimeter system for ALLEGRO FCC-ee detector concept

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The future circular electron-positron collider (FCC-ee) will be a unique precision instrument designed to offer great direct and indirect sensitivity to new physics. Its primary purpose will be to study the heaviest known particles (Z, W, and H bosons and the top quark) with unprecedented precision, a goal that introduces multiple challenges in the detector design. Key requirements for the detector include excellent energy and angular resolution coupled with strong particle identification capabilities.
One of the proposed experiments for FCC-ee is ALLEGRO, a general-purpose detector concept that is currently in its design and optimization phase. This contribution aims to introduce ALLEGRO's calorimeter system, offering a comprehensive overview of the baseline technologies planned for its two calorimeter systems: a highly granular noble-liquid electromagnetic calorimeter and a hadronic calorimeter with scintillating-light readout using wavelength shifting fibers.
To assess the calorimeters'performance, test different detector geometries, and fine-tune reconstruction algorithms such as topological clustering, we employ Monte Carlo simulations of single particles. Preliminary results from performance studies with the standalone HCal and combined ECal+HCal calorimeters are presented, thus shedding light on the promising capabilities of this newly introduced detector concept for FCC-ee. In addition to these design-focused analyses, we briefly introduce our inquiries into the potential use of machine-learning approaches for particle identification and detector calibration.

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