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Beam test results and uniformity studies of high-density glass scintillator tiles

The Future Circular Electron-Positron Collider (CEPC) demands advanced detector systems with excellent jet energy resolution. To address these requirements, a new high-granularity hadronic calorimeter design has been proposed. The major motivation is to significantly improve the hadronic energy resolution using high-density glass scintillator tiles to achieve a higher energy sampling fraction. The performance of the glass scintillator tile is crucial, particularly regarding the Minimum Ionizing Particle (MIP) light output and the response uniformity. We developed a dedicated test system and conducted beam tests at DESY to assess the performance of an individual glass scintillator tile. The experimental results demonstrate that nine glass scintillator tiles, each with dimensions of 4×4×1 cm^3, achieved MIP light outputs ranging from 72 to 98 p.e./MIP. Additionally, we studied the response uniformity of an individual glass scintillator tile through both experiments and simulations.

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