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Assessing the performance of metalenses to enhance the light collection of silicon photomultipliers

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A metalens is an emerging type of flat optical metamaterial that presents several advantages over a traditional lens, such as reduced cost and reduced bulkiness. We developed a set of software tools and fabrication procedures for the rapid development and characterization of new metalens designs. A large field-of-view centimeter-scale metalens was fabricated, and its performance compared with GEANT4-based predictions. We explored the potential in using this metalens to gain an increase in SiPM light collection in a variety of detector geometries.

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