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Increasing photodetector light collection with metalenses

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We present a design concept and preliminary results for a method to increase the light collected by a sparse array of SiPMs by placing a metalens in front of each photodetector. A metalens is a flat lens that uses nanostructures on the surface to focus incident light. Metalenses offer similar focusing power to traditional lenses, but with reduced bulk and cost, and can be mass-produced in industry nanofabrication facilities. Their use could allow the next generation of large-scale physics detectors to obtain an increase in their light collection and further their science reach while simultaneously reducing the required number of readout channels needed to meet their design goals.

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