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PROGRAMMABLE PURE PHASE SPATIAL TERAHERTZ MODULTOR

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Terahertz (THz) radiation has many potential applications. However, comparing with the rapid development of THz sources and detectors, the functional devices for THz modulation, especially the spatial modulation devices, are still insufficiency. Here, we present a novel approach for generating arbitrary wavefronts of a THz beam by dynamically creating metasurface structures through illuminating a thin silicon wafer with femtosecond laser, which is spatially modulated to result in an array of reconfigurable subwavelength resonators. The wavefront of the THz beam is then determined by forming spatial profiles of the Pancharatnam-Berry scattering phase by dynamically controlling the resonator orientation. Proof-of-concept experiments demonstrate that streaming holographic images and lenses of variable focal length can be realized in real time. The reconfigurable scheme demonstrated here is convenient and fast, and may lead to advances in a host of THz applications.

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