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Title:Modulating Sub-THz radiation with current in superconducting metamaterial

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Abstract:We show that subterahertz transmission of the superconducting metamaterial, an interlinked two-dimensional network of subwavelength resonators connected by a continuous superconducting wire loop, can be dynamically modulated by passing electrical current through it. We have identified the main mechanisms of modulation that correspond to the suppression of the superconductivity in the network by magnetic field and heat dissipation. Using the metamaterial fabricated from thin niobium film, we were able to demonstrate a transmission modulation depth of up to 45% and a bandwidth of at least 100kHz. The demonstrated approach may be implemented with other superconducting materials at frequencies below the superconducting gap in the THz and subterahertz bands. © 2012 American Physical Society.

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