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GaAs based antenna-coupled terahertz detector operating at 300 K SANGWOO KIM, Physics Dept., UCSB, JERAMY ZIMMERMAN, Materials Dept., UCSB, PAOLO FOCARDI, JPL, Pasadena, CA, DONG HO WU, Naval Research Lab, Washington, D.C., ARTHUR C. GOSSARD, Materials Dept., UCSB, MARK S. SHERWIN, Physics Dept., UCSB — A Terahertz detector which consists of twin-slot antennas, coplanar waveguides, and a GaAs Metal Semiconductor-Field-Effect-Transistor (MESFET) has been developed. This talk will present design, fabrication, and recent measurements of our detector. As Terahertz photons are coupled into the antenna, an oscillating electric field is formed across the two gates of the GaAs MESFET. Then the oscillating electric field excites collective motion of the electron plasma in the active area, thereby changing the source-to-drain resistance of the transistor. The impedances of the antenna and the transistor were matched in order to maximize the power coupling efficiency. Our device is designed to have electronics-limited response time ($\sim$1 ns), broadband ($\sim$0.5 THz, HWHM) response, low Noise Equivalent Power (NEP) ($\sim 10^{-10}$ Watt/(Hz)$^{1/2}$), responsivity of $\sim$1000 V/W, and ability to operate at room temperature.

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