

Abstract Submitted
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THz pump-THz probe study of electrostatically gated graphene¹

JINGDI ZHANG, MENGKUN LIU, MARTIN WAGNER, D. N. BASOV, RICHARD D. AVERITT, Univ of California - San Diego — We investigate ultrafast carrier dynamics in graphene using THz-pump THz-probe spectroscopy. In contrast to recent studies using optical excitation [1] [2], THz excitation exclusively initiates intra-band transitions, resulting in an increase in the carrier scattering rate. The corresponding transient peak of the transmitted probe signal scales linearly with the E-field of the incident THz pump pulse. Further, the decay time of the excited carriers is independent of the gating voltage. As the Fermi level is tuned toward the charge neutral point (CNP) by varying the electrostatic gate voltage, the induced increase in transmission is strongly suppressed. We believe that the low density of states near the CNP is responsible for this suppression. [1] Shi, S. F., Tang, et. al. *Nano Lett.*, 14(3), 1578-1582 (2014). [2] A. J. Frenzel, et. al. *Phys. Rev. Lett.* 113, 056602 (2014).

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