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标题: Current relaxation due to hot carrier scattering in graphene
作者: Sun, D (Sun, Dong); Divin, C (Divin, Charles); Mihnev, M (Mihnev, Momchil); Winzer, T (Winzer, Torben); Malic, E (Malic, Ermin); Knorr, A (Knorr, Andreas); Sipe, JE (Sipe, John E.); Berger, C (Berger, Claire); de Heer, WA (de Heer, Walt A.); First, PN (First, Phillip N.); Norris, TB (Norris, Theodore B.)
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摘要: In this paper, we present direct time-domain investigations of the relaxation of electric currents in graphene due to hot carrier scattering. We use coherent control with ultrashort optical pulses to photoinject a current and detect the terahertz (THz) radiation emitted by the resulting current surge. We pre-inject a background of hot carriers using a separate pump pulse, with a variable delay between the pump and current-injection pulses. We find the effect of the hot carrier background is to reduce the current and hence the emitted THz radiation. The current damping is determined simply by the density (or temperature) of the thermal carriers. The experimental behavior is accurately reproduced in a microscopic theory, which correctly incorporates the nonconservation of velocity in scattering between Dirac fermions. The results indicate that hot carriers are effective in damping the current, and are expected to be important for understanding the operation of high-speed graphene electronic devices.
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地址: [Sun, Dong; Divin, Charles; Mihnev, Momchil; Norris, Theodore B.] Univ Michigan, Ctr Ultrafast Opt Sci, Ann Arbor, MI 48109 USA
[Winzer, Torben; Malic, Ermin; Knorr, Andreas] Tech Univ Berlin, Inst Theoret Phys, D-10623 Berlin, Germany
[Sipe, John E.] Univ Toronto, Dept Phys, Toronto, ON M5S 1A7, Canada
[Sipe, John E.] Univ Toronto, Inst Opt Sci, Toronto, ON M5S 1A7, Canada
[Berger, Claire; de Heer, Walt A.; First, Phillip N.] Georgia Inst Technol, Sch Phys, Atlanta, GA 30332 USA
[Sun, Dong] Peking Univ, Int Ctr Quantum Mat, Beijing 100871, Peoples R China
通讯作者地址: Norris, TB (通讯作者),Univ Michigan, Ctr Ultrafast Opt Sci, Ann Arbor, MI 48109 USA.
电子邮件地址: tnorris@eecs.umich.edu
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