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Pulsed Tera-hertz Radition from Femto-second Laser Excited Superconductive $YBa_2Cu_3O_{7-\delta}$ Antenna SHYH-SHII PAI, CHENG-CHUNG CHI, Department of Physics, National Tsing Hua University, Hsinchu, Taiwan, R. O. C. — We have observed the ultrashort electromagnetic pulse radiation from a current-biased bow-tie structure of $YBa_2Cu_3O_{7-\delta}$ thin film dipole antenna on MgO using 100 fs, 750 nm laser pulses. With the electro-optic detection, we obtained the THz pulses with 1.0 ps full width at half maximum, containing frequency components up to 1.0 THz. The THz peak amplitude dependence shows the saturation and a nonlinear behavior with a higher excitation pumping power and with the applied bias currents. The saturation on the dependence with the excitation powers exhibits the bolometric heating in nature. However, the nonlinear characterization of the THz radiation from the superconductive thin film antenna revealed that the inadequacy of pure supercarrier approximation on a two-fluid model. The ultrashort transient response and the deviation from the classical theory are discussed in relation to the quasiparticle dynamics of the nonequilibrium mechanism.

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