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Coherent THz-wave emission from voltage- and number-controlled intrinsic Josephson junctions in $Bi_2Sr_2CaCu_2O_{8+\delta}$[1] MANABU TSUJIMOTO, RYO NAKAYAMA, NAOKI ORITA, TAKASHI KOIKE, KOTA DEGUCHI, KAVEH DELFANAZARI, TAKASHI YAMAMOTO, TAKANARI KASHIWAGI, HIDETOSHI MINAMI, MASASHI TACHIKI, KAZUO KADOWAKI, University of Tsukuba — Intense and coherent terahertz electromagnetic wave (THz-wave) emission from the intrinsic Josephson junctions (IJJs) in single crystalline high-T_c superconductor $Bi_2Sr_2CaCu_2O_{8+\delta}$ (Bi-2212) was reported in 2007 [L. Ozyuzer *et al.*, Science **318**, (2007) 1291.]. In the present work, we demonstrate the relationship between the bias condition and the resonance state by controlling both the applied voltage, V, and the number of resistive junctions, N. We directly observed that if N junctions are in resistive state, the resonance frequency, f_J, varies in accordance with the ac-Josephson relation; $f_J = (2|e|/h)V/N$, although frequency f_J has previously been thought to be uniquely determined by the geometrical condition due to the cavity resonance effect [M. Tsujimoto *et al.*, Phys. Rev. Lett. **105**, (2010) 037005.]. We also found that the emission intensity varies as a function of both f_J and N.

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