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Title:In-plane dissipation as a possible synchronization mechanism for terahertz radiation from intrinsic Josephson junctions of layered superconductors
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Abstract:Strong terahertz radiation from the mesa structure of a Bi₂Sr₂CaCu₂O_{8+δ} single crystal has been observed recently, where the mesa intrinsically forms a cavity. For a thick mesa of a large number of junctions, there are many cavity modes with different wave vectors along the c axis corresponding to almost the same bias voltages. The mechanism responsible for exciting the uniform mode which radiates coherent terahertz waves in experiments is unknown. In this paper, we show that the in-plane dissipation selects the uniform mode. For perturbations with nonzero wave numbers along the c axis, the in-plane dissipations are significantly enhanced, which prevents the excitation of corresponding cavity modes. Our analytical results are confirmed by numerical simulations.
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Inspec controlled terms:bismuth compounds - calcium compounds - excitons - high-temperature superconductors - inhomogeneous media - Josephson effect - strontium compounds - terahertz waves
Uncontrolled terms:in-plane dissipation - synchronization mechanism - terahertz radiation - intrinsic Josephson junctions - layered superconductors - mesa structure - cavity modes - wave vectors - bias voltage - coherent terahertz waves - Bi₂Sr₂CaCu₂O_{8+δ}
Inspec classification codes:A7450 Superconductor tunnelling phenomena, proximity effects, and Josephson effect - A7470J Superconducting layer structures and intercalation compounds - A7135 Excitons and related phenomena - A7470V Perovskite phase superconductors
Chemical indexing:Bi2Sr2CaCu2O8/ss Bi2/ss Cu2/ss Sr2/ss O8/ss Bi/ss Ca/ss Cu/ss Sr/ss O/ss
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