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The cavity resonance mode of $Bi_2Sr_2CaCu_2O_8$ mesa terahertz sources as probed by scanning laser thermal microscopy[1] TIMOTHY BENSEMAN, Queens College CUNY, ALEXEI KOSHELEV, VITALII VLASKO-VLASOV, ULRICH WELP, WAI-KWONG KWOK, Argonne National Laboratory, YANG HAO, University of Illinois at Chicago, BORIS GROSS, MATTHIAS LANGE, DIETER KOELLE, REINHOLD KLEINER, University of Tuebingen, KAZUO KADOWAKI, University of Tsukuba — Stacked Intrinsic Josephson Junctions (IJJs) in the extremely anisotropic high-T_c superconductor $Bi_2Sr_2CaCu_2O_8$ are a promising solid-state source of coherent terahertz radiation in the so-called "THz gap" range. In these devices, a geometric resonant mode of a stack of IJJs of typical dimensions 300 x 60 x 1 microns[3] acts to synchronize the individual junctions, resulting in coherent far-field THz emission. This resonance can be probed by scanning thermal laser microscopy, in which a modulated optical laser beam is rastered across the top surface of a stack. The resulting thermal perturbation to the stack's cavity mode can thus be mapped via the resulting xy-dependent modulation of the stack's electrical resistance. Here we discuss the experimentally measured scanning laser pattern of such a THz cavity mode, and the implications of its symmetry for the mechanism of IJJ synchronization in these devices.

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