Quasiparticle mixing and Josephson electrodynamics in non-uniform parallel junction arrays

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Multijunction arrays represent an attractive alternative to single junction SIS mixer devices to provide wideband heterodyne mixers, without the complication of high current density. We have designed such 5-junction arrays to operate in the 460-650 GHz bandwidth.. Our FTS (Fourier Transform Spectroscopic) and heterodyne measurements performed on arrays of 1-μm^2 junctions with current densities ranging from 4 to 13 $kA\,cm^{-2}$, confirm the bandwidth improvement brought by the multijonction arrays combined with a high mixer sensitivity. We also investigated the static and dynamical states of the Josephson tunnel current in these arrays. The presence in *I-V* curves of resonant zero-field steps (ZFS), usually observed in long Josephson junctions (LJJ), indicates the occurence of fluxon motion, and allows to foresee new applications for these devices, not only as mixers but as submillimeter-wave LO sources.