55. Title: Terahertz electromagnetic radiation from intrinsic Josephson junctions at zero magnetic field via breather-type self-oscillations

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Abstract: I propose a new mechanism of intense high-frequency electromagnetic wave generation by spatially uniform stacked Josephson junctions at zero magnetic field. The ac-Josephson effect converts the dc-bias voltage into ac supercurrent; however, in the absence of spatial variation of the Josephson phase difference it does not provide dc-to-ac power conversion, needed for emission of electromagnetic waves. Here I demonstrate that at geometrical resonance conditions, spatial homogeneity of the phase can be spontaneously broken by the appearance of breathers (bound fluxon-antifluxon pairs), facilitating effective dc-to-ac power conversion. This leads to self-oscillations at cavity-mode frequencies, accompanied by the emission of radiation. The proposed mechanism explains all major features of recently observed THz radiation from large-area Bi2Sr2CaCu2O8+x mesa structures.