

Abstract Submitted  
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**New Method for Imaging Gap Nodal Structure of Unconventional Superconductors through the Anisotropic Nonlinear Meissner Effect<sup>1</sup>**  
SEOKJIN BAE, YUEWEN TAN, RAHUL GOGNA, NATHAN MENDELSON, Univ of Maryland-College Park, STEVEN REMILLARD, Hope College, STEVEN ANLAGE, Univ of Maryland-College Park — We present a new measurement method which can be used to image gap nodal structure of superconductors whose pairing symmetry is unknown. This method utilizes photoresponse from a microwave resonance of the superconducting sample perturbed by a scanned laser spot. For an epitaxial or single crystal sample, the anisotropy of this photoresponse is directly related to that of gap function via the non-linear Meissner coefficient, so the gap nodal directions can be inferred from the photoresponse image. The significant advantage of the presented method over previous spiral or lumped circuit resonator methods is that it does not require a complicated lithographic patterning process which often degrades superconductivity or introduces defect-dominant photoresponse and hence limits one from testing various kinds of materials. The validity of the method is confirmed both by HFSS simulation and experiments on unpatterned superconducting thin films. Photoresponse images from example unconventional superconductors will be also presented and discussed.

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