

Abstract Submitted  
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**Extreme and Local 3rd Harmonic Response of Niobium (Nb) Superconductor**<sup>1</sup> BAKHROM ORIPOV, Univ of Maryland-College Park, TAMIN TAI, Oak Ridge National Laboratory, STEVEN ANLAGE, Univ of Maryland-College Park — Superconducting Radio Frequency (SRF) cavities are being widely used in new generation particle accelerators. These SRF cavities are based on bulk Nb. Based on the needs of the SRF community to identify defects on Nb surfaces, a novel near-field magnetic microwave microscope was successfully built using a magnetic writer from a conventional magnetic recording hard-disk drive<sup>1</sup>. This magnetic writer can create an RF magnetic field, localized and strong enough to drive Nb into the vortex state. This probe enables us to locate defects through scanning and mapping of the local electrodynamic response in the multi-GHz frequency range. Recent measurements have shown that 3rd harmonic nonlinear response is far more sensitive to variations in input power and temperature than linear response, thus we mainly study the 3rd harmonic response. Moreover, the superconductor is usually the only source for nonlinear response in our setup, thus there is less chance of having noise or background signal. Understanding the mechanism responsible for this non-linear response is important for improving the performance of SRF cavities. Besides Nb we also study various other superconductors such as MgB2 and the cuprate Bi-Sr-Ca-Cu-O (BSCCO) for potential applications in SRF cavities.

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