Nonlinear Elastoresistivity Response in the $A_{1g}$ Symmetry Channel of the Iron Superconductor $\text{Ba(Fe}_{0.975}\text{Co}_{0.025})_2\text{As}_2$ J ohanna C. Palmstrom, Stanford University, Jiun-Haw Chu, Stanford University and University of Washington, Ian R. Fisher, Stanford University — Elastoresistivity relates changes in resistance of a material to strains that it experiences. Previously we have shown how the $B_{2g}$ component of the elastoresistivity tensor is proportional to the nematic susceptibility, and hence can be used to infer a divergence of the nematic susceptibility approaching the tetragonal-to-orthorhombic structural phase transition in the Fe-based superconductors. In this talk I will introduce a new application of elastoresistance measurements for probing the resistivity response in the $A_{1g}$ symmetry channel. This is not a nematic symmetry; rather, it describes the isotropic response to strains that the material experiences. This technique was performed on a stereotypical iron based superconductor, $\text{Ba(Fe}_{0.975}\text{Co}_{0.025})_2\text{As}_2$. We find that the response in the $A_{1g}$ channel is nonlinear with a quadratic elastoresistance coefficient that diverges close to the tetragonal to orthorhombic structural transition. I will explain the significance of these measurements and how they fit with our understanding from previous measurements of the $B_{2g}$ elastoresistance response.

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