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Elastoresistivity in the "Hidden Order" compound $URu_2Si_{2-x}P_x$ CAMILLA MOIR, Florida State University, National High Magnetic Field Laboratory, RYAN BAUMBACH, National High Magnetic Field Laboratory, ANDREW GALLAGHER, KUAN-WEN CHEN, Florida State University, National High Magnetic Field Laboratory, ARKADY SHEKHTER, GREG BOEBINGER, SCOTT RIGGS, National High Magnetic Field Laboratory — The intermetallic compound URu_2Si_2 undergoes a phase transition near 17.5 K, with clear thermodynamic and transport signatures. However, despite nearly 30 years of research, the nature of the order parameter remains unknown. This "hidden order" phase, and its relationship to the superconductivity that appears below 1.4 K, remains a central puzzle in the physics of correlated electron materials. In order to unfold the phenomena that are nascent in pure URu_2Si_2, we recently developed a flux growth technique that allows electron doping through Si $\rightarrow$ P substitution. This technique is novel because it enables the use of high vapor pressure elements. We find that phosphorous substitution suppresses the hidden order transition temperature until, at roughly 1.5% doping, a quantum phase transition is reached. We measure the doping evolution of the temperature dependent elastoresistivity focusing on the behavior of the nematic component (b2g) as the Hidden Order transition is approached.

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