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Anisotropic transient reflectivity across optimal doping in the isovalent-doped superconductor $\mathbf{BaFe_2(As_{1-x}P_x)_2}$ ERIC THEWALT, JAMES HINTON, JOSEPH ORENSTEIN, UC Berkeley, LBNL, IAN HAYES, UC Berkeley, TONI HELM, JAMES ANALYTIS, UC Berkeley, LBNL — The isovalent-doped high-T_c superconductor $BaFe_2(As_{1-x}P_x)_2$ is characterized by a rich temperature-doping phase diagram, which includes structural, antiferromagnetic, electron nematic, and superconducting phase transitions. Of particular note is the proposed existence of a quantum critical point at optimal doping. In this work, we use 1.5 eV pump-probe reflectivity measurements to study the recombination dynamics of photoexcited quasiparticles as a function of temperature, doping, and polarization. We find that the low-temperature response is strongly anisotropic across a wide range of dopings, both above and below optimal. This indicates that the anisotropy arises independently of the orthorhombic-tetragonal and antiferromagnetic phase transitions, which occur only on the underdoped side of the phase diagram.

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