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High Field Hall Effect and Critical Physics in BaFe2(As1-xPx)2
IAN HAYES, Department of Physics, University of California, Berkeley, BRAD RAMSHAW, National High Magnetic Field Laboratory Pulsed Field Facility, Los Alamos National Laboratory, GILBERT LOPEZ, JAMES ANALYTIS, Department of Physics, University of California, Berkeley — Thirty years after the discovery of the cuprates, the precise nature of the electronic state that leads to very high superconducting transition temperatures is still a mystery. A significant clue has come from the charge transport properties of these systems, which are similar to those seen in quantum critical metals. These properties include a T-linear resistivity and a cotangent of the Hall angle that grows as T-squared. However, it is difficult to say whether these properties are accidental or essential to the physics of High-Tc superconductivity. The iron-based high-Tc superconductors provide an important point of comparison on this question. I will report on high-field magnetoresistance measurements, including Hall effect data up to 65 Tesla, on the iron-pnictide compound BaFe2(As1-xPx)2. Although the presence of multiple bands in these materials may lead us to expect otherwise, the charge transport in these materials reflects many of the universal properties of quantum critical metals that also appear in the cuprates, suggesting that these properties are intimately connected to the physics of High-Tc superconductivity.

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