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Flux Pinning and Quasi-particle Scattering in Charge- Doped Iron-Based Superconductors KEES VAN DER BEEK, S. DEMIRDIS, M. KONCZYKOWSKI, Laboratoire des Solides Irradies, Ecole Polytechnique, CNRS UMR 7642 & CEA/DSM/IRAMIS, 91128 PALAISEAU, France, S. KASAHARA, T. TERASHIMA, Research Center for Low Temperature and Materials Sciences, Kyoto University, Sakyo-ku, Kyoto 606-8501, Japan, R. OKAZAKI, T. SHIBAUCHI, YUJI MATSUDA, Department of Physics, Kyoto University, Sakyo-ku, Kyoto 606-8502, Japan — Whereas isovalently doped iron-based superconductors, such as $BaFe_2(As_{1-x}P_x)_2$ and $Ba(Fe_{1-x}Ru_x)_2As_2$ show only strong, "individual-defect" vortex pinning due to nanometer-sized defects, charge-doped iron-pnictide superconductors show a low-field, field-independent contribution to the critical current density j_c that is well described by the collective pinning theory. Quantitative analysis of the magnitude, temperature, and field-dependence of j_c in the $PrFeAsO_{1-y}$ compound shows that the behavior of j_c can be fully explained, if one assumes the oxygen vacancies in this material to be responsible for quasi-particle scattering in the vortex cores. Analysis of j_c of this and other charge-doped compounds such as NdFeAs(O,F), $(Ba,K)Fe_2As_2$, and $Ba(Fe,Co)_2As_2$ yields estimates for the transport scattering cross-section of the dopant impurities in all these materials. We find scattering to be in the Born limit, with a scattering phase angle δ_0 such that $\sin\delta_0 \sim 0.2 - 0.3$.

Cornelis Jacominus van der Beek
Laboratoire des Solides Irradies, Ecole Polytechnique,
CNRS UMR 7642 & CEA/DSM/IRAMIS, 91128 PALAISEAU, France

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