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 $\text{BaFe}_2(\text{As}_{1-x}\text{P}_x)_2$ and $\text{Ba(Fe}_{1-x}\text{Ru}_x)_2\text{As}_2$ 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$_2$As$_2$, and Ba(Fe,Co)$_2$As$_2$ 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 $\delta_0$ such that $\sin \delta_0 \sim 0.2 - 0.3$. 

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