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Using controlled disorder to distinguish $s_{\pm}$ and s_{++} gap structure in Fe-based superconductors[1] YAN WANG, ANDREAS KREISEL, PETER HIRSCHFELD, Department of Physics, University of Florida, Gainesville, Florida 32611, USA, VIVEK MISHRA, Materials Science Division, Argonne National Laboratory, Lemont, IL 60439, USA — We reconsider the effect of disorder on the properties of a superconductor characterized by a sign-changing order parameter appropriate for Fe-based materials. Within a simple two band model, we calculate simultaneously T_c, the change in residual resistivity $\Delta\rho_0$, and the zero-energy density of states, and show how these results change for various types of gap structures and assumptions regarding the impurity scattering. The rate of T_c suppression is shown to vary dramatically according to details of the impurity model considered. We search therefore for a practical, experimentally oriented signature of a gap of the $s_{\pm}$ type, and propose that observation of particular evolution of the penetration depth, thermal conductivity or NMR temperature dependence with disorder would suffice.

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