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Probing the Superconducting Order Parameter of $\text{Ba}(\text{Fe}_{1-x}\text{Co}_x)_2\text{As}_2$ by Josephson Interferometry¹

J.M. ATKINSON, D.J. VAN HARLINGEN, University of Illinois at Urbana-Champaign, P. CANFIELD, N. NI, Iowa State University, J.D. STRAND, Syracuse University — Since the discovery of the first Fe-based superconductors in 2006, extensive effort has been directed toward characterizing and modeling the novel properties of these exotic materials, in particular, the symmetry of their superconducting order parameter. We probe the order parameter in Co-doped BaFe_2As_2 single crystals by fabricating Josephson junctions on polished faces orthogonal to the c-axis. It has been proposed that the Fe-pnictides form electron and hole pockets in the Fermi surface that have s-wave Cooper pair symmetry but opposite phases, the so-called s_{\pm} model. The modulation of the critical current I_C as a function of magnetic flux applied along the c-axis is different for junctions fabricated on a corner (between [100] and [110] faces) or on an edge (either [100] or [110]). In the same way, the product $I_C R$ should be different for each type of junction. The combination of these effects may help us map the phase anisotropy and test for this pairing symmetry. We will present preliminary results of these studies and attempts to match them with existing theoretical models.

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