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S-wave superconductivity from predominantly d-wave pairing PAUL ORETO, Department of Physics, Stanford University, BORIS SPIVAK, Department of Physics, University of Washington, Seattle, STEVEN KIVELSON, Department of Physics, Stanford University — We have studied the zero temperature properties of a system consisting of dilute superconducting droplets embedded in a weakly disordered Fermi liquid metal. Even under the assumption that the pairing interaction occurs exclusively in the d-wave channel, irregularities in the shape of the droplets, or impurities within the droplet generically induce local mixing of s-wave and d-wave components of the superconducting order. Moreover, we find that the Josephson coupling between the s-wave components of the order parameter on two droplets separated by a distance r falls off as a slower power law than does the d-wave component. Thus, for dilute enough droplets, even if the local gap structure within each droplet is dominantly d-wave-like, the globally phase coherent portion of the superconducting order must have s-wave symmetry. We speculate that this effect could lead to a region of globally s-wave superconductivity in highly overdoped cuprates.

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