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Frustrated proximity effects between s and $s_\pm$ superconductors VALENTIN STANEV, ALEXEI E. KOSHELEV, Materials Science Division, Argonne National Laboratory — The nature of the superconducting order parameter (OP) in iron pnictides and chalcogenides is a hotly debated issue. It was theoretically proposed that the OP has opposite signs on the hole and the electron bands, i.e., it belongs to the unconventional class of $s_\pm$ (or extended s)-wave. There are, however, very few experiments that can directly distinguish this state from the ordinary s-wave OP. One way to address this problem is to study the proximity effects in a sandwich composed of conventional and iron pnictide superconductors (SC). If the pnictides indeed have the $s_\pm$ OP this system is intrinsically frustrated. In the case of strong frustration, a time-reversal symmetry-breaking (TRSB) SC state emerges, in which the OP phases in different bands are tilted at an angle, different from π, and controlled by the coupling strength. Observation of such state in the iron-based SC materials would give definite evidence for the $s_\pm$ OP. We present a microscopic, fully self-consistent approach to this problem, based on Usadel equations. We have studied the conditions for existence of the TRSB state and its experimental signatures.

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