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Time-reversal symmetry broken metallic states in multiband superconductors[1] TROELS ARNFRED BOJESEN, Norwegian University of Science and Technology, EGOR BABAEV, University of Massachussetts at Amherst, ASLE SUDBO, Norwegian University of Science and Technology — The recent discovery of so-called multiband superconductors, like the iron pnictides, has spurred a surge in interest for superconductors with several bands crossing the Fermi level. The reason for this is that frustration in interband couplings may lead to a broken Z_2 ("time reversal") symmetry in addition to the "ordinary" breaking of the U(1) symmetry in single band superconductors, opening up for the possibility of new forms of topological excitations and interesting new physics. We have investigated phase diagrams and phase transitions of $\mathrm{U}(1) \times \mathrm{Z}_2$ superconductors in 2D and 3D beyond mean-field approximation, using large-scale Monte Carlo simulations. In addition to the superfluid $\mathrm{U}(1) \times \mathrm{Z}_2$ and U(1) broken states, we find, in a certain parameter regime, a new, non-superfluid (metallic) Z_2 broken (but U(1) symmetric) state where time-reversal symmetry is spontaneously broken.

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Asle Sudbo
Norwegian University of Science and Technology

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