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Pressure dependence of critical temperature of bulk FeSe from spin fluctuation theory[1] PETER HIRSCHFELD, ANDREAS KREISEL, YAN WANG, Department of Physics, University of Florida, Gainesville, FL 32611-8440, USA, MILAN TOMIC, HARALD JESCHKE, ANTHONY JACKO, ROSER VALENTI, Institut für Theoretische Physik, Universität Frankfurt, 60438 Frankfurt, Germany, THOMAS MAIER, Center for Nanophase Materials Sciences and Computer Science and Mathematics Division, Oak Ridge National Laboratory, Oak Ridge, TN 37831-6494, USA, DOUGLAS SCALAPINO, Department of Physics, University of California, Santa Barbara, CA 93106-9530, USA — The critical temperature of the 8K superconductor FeSe is extremely sensitive to pressure, rising to a maximum of 40K at about 10GPa [1]. We test the ability of the current generation of fluctuation exchange pairing theories to account for this effect, by downfolding the density functional theory electronic structure for each pressure to a tight binding model. The Fermi surface found in such a procedure is then used with fixed Hubbard parameters to determine the pairing strength using the random phase approximation for the spin singlet pairing vertex. We find that the evolution of the Fermi surface captured by such an approach is alone not sufficient to explain the observed pressure dependence, and discuss alternative approaches.
[1] S. Margadonna, *et al.*, Phys. Rev. B **80**, 064506 (2009); S. Medvedev, *et al.*, Nat. Mater. **8**, 630 (2009).

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