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Spin Susceptibility Enhancement in Superconductors[1] BEN ROSEMEYER, ANTON VORONTSOV, Montana State University — We calculate electronic vector-dependent spin susceptibility tensor, $\chi_{\alpha\beta}(\mathbf{q})$, in the superconducting state, for a 2D Fermi surface. We investigate dependence of $\chi_{\alpha\beta}(\mathbf{q})$ on: a) magnetic ordering wave vector $\mathbf{q}$; b) symmetry of the order parameter, $\Delta(\mathbf{k})$; c) temperature; and d) effects of external Zeeman field. We find that under certain conditions longitudinal and transverse components of the susceptibility in the superconducting state can be enhanced compared to the normal state value, indicating effective attraction between magnetically ordered and superconducting phases. In particular, d-wave superconductors at low temperatures in strong magnetic field show increase of χ for $q = 2k_f - \delta q$ ($\delta q/k_f \approx 0.05$) for near-nodal direction of $\mathbf{q}$. We relate such enhancement or lack thereof to behavior of low-energy excitations in the system. These findings may be relevant to materials where magnetic and superconducting phases are close neighbors, such as heavy fermion $CeCoIn_5$, or Fe-based superconductors.

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