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Features of Fermi Systems near ℓ=0 Pomeranchuk Instabilities: A Crossing Symmetric Approach KELLY REIDY, KHANDKER QUADER, Kent State University, KEVIN BEDELL, Boston College — In Fermi systems, interactions can cause symmetry-breaking deformations of the Fermi surface, called Pomeranchuk instabilities. In Fermi liquid (FL) language, this occurs when one of the Landau harmonics $F_\ell^{a,s} \rightarrow -(2\ell + 1)$; e.g. $F_0^{a,s} = -1$ are related to ferromagnetic (a), and density instabilities (s) resepctively. The corresponding point in parameter space may be viewed as a quantum critical point (QCP). Using graphical and numerical methods to solve coupled non-linear integral equations of a crossing symmetric equation (TSCE) scheme, we study the behavior of spin/density excitations; effective mass; ferromagnetic, spin density wave, phase separation, and pairing transitions near ℓ=0 Pomeranchuk instabilities in a 3D Fermi system. Considering momentum dependence of the renormalized FL interactions, we find a number of results for repulsive and attractive couplings of arbitrary strengths; viz. attraction in both singlet and triplet pairing amplitudes (though singlet pairing is primarily favored); possibility of a second ferromagnetic transition due to spin waves, and possibility of phase separation with and without ferromagnetic transition. Some of our results may apply to ferromagnetic superconductors, such as UGe_2 and UIr.

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