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Tractable Crossing-symmteric Equations Formalism and Applications in Two Dimensions KELLY REIDY, KHANDKER QUADER, Kent State University, KEVIN BEDELL, Boston Collge — The tractable crossing symmetric formalism is developed for the 2D case. We first consider circular Fermi surfaces and then extend this to 2D square lattice systems. Limiting cases, such as small (q, ω), vanishing momentum-energy transfer $(q \to 0, \omega \to 0)$, vanishing q but non-zero ω are considered. This is applied to the study of various properties of 2D Fermi systems. Of particular interest is the physics near Pomeranchuk instabilities: in Fermi systems, interactions can cause symmetry-breaking deformations of the Fermi surface, called Pomeranchuk instabilities. In Fermi liquid theory language, this occurs when one of the Landau harmonics $F_\ell^{s,a} \to -(2\ell + 1)$; e.g. $F_0^{s,a} \to -1$ are related to ferromagnetic transition (a), and density instabilities(s). The corresponding points in parameter space may be viewed as quantum critical points. Using graphical and numerical methods to solve coupled non-linear integral equations that arise in the crossing symmetric equation scheme, we obtain results in the 2D case close to Pomeranchuk instabilities. We compare our 2D results for various response functions and instabilities with the results of recent calculations in the 3D case, which will also be discussed.

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