Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Nature of Fermi Systems near l=0 Pomeranchuk Instability: A Tractable Crossing Symmetric Equation Approach KELLY REIDY, KHANDKER QUADER, Kent State University, KEVIN BEDELL, Boston College — In Fermi liquids, a Pomeranchuk instability occurs when one of the Landau parameters $F_\ell^{a,s} \to -(2\ell+1)$. The Pomeranchuk instabilities at $F_0^{a,s} = -1$ are related to respectively to a ferromagnetic transition (a), and to a density wave or charge instability resulting in phase separation (s). We use the tractable crossing symmetric equations (TSCE) method to explore the nature of quantum fluctuations, excitations and pairing in a 3D Fermi system, around these points. We obtain interesting limiting results at zero and finite momentum (q), and in the limits of large and small coupling strengths. We develop methods to deal with a set of finite-q singularities in the competing quantum fluctuation terms contained in TSCE; these may have physical significance. Using graphical and numerical methods to solve coupled non-linear integral equations that arise in the TSCE scheme, we obtain results for the behavior of spin and density excitations, and pairing properties around the instability points. Our results may have relevance to ferromagnetic superconductors.

Khandker Quader
Kent State University

Date submitted: 19 Nov 2010 Electronic form version 1.4