Superfluid Ground State of Neutron Matter and Other Strongly Interacting Many-Fermion Systems.

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In eq. (1), $E(\Psi)$ should be written as $E[\Psi]$.

Equation (5) for the effective two-body potential is incorrect as written; it should read simply

$$(5) \quad w(12) = \frac{\hbar^2}{m} (\nabla f(r_{12}))^2 + f^2(r_{12})v(12) .$$

(Equation (6) should then be omitted.) There *will* be an additional two-body contribution to the superfluid-state energy expectation value, but from all indications this contribution is small. For one thing, it is of higher order in the « smallness parameter » $\xi = \rho \int [f^2(r) - 1] d\mathbf{r}$ of the cluster expansion.

Figure 1 is to be replaced by the Figure given here. The caption remains unchanged, the labels 1), 2), 3), 4) referring to Ohmura potentials with hard-core radii $c = 0.0, 0.2, 0.4$ and 0.6 fm, respectively. These potentials, incidentally, are the ones which produce the values $r_s = 2.7$ fm for the singlet effective range.

The concluding sentences, beginning with « In the equation for $\varepsilon_{\mathbf{k}}$ we set ... » should then be restated as follows:

... In the equations for $\varepsilon_{\mathbf{k}}$ and λ we set $\Delta_{\mathbf{k}} = 0$; thus, $\varepsilon_{\mathbf{k}}$ is given by the usual normal-state Hartree-Fock expression (for which we found an effective-mass representation to be adequate) and λ becomes simply ε_{k_F} ⁽¹⁴⁾. The gap equation was solved by a self-consistency technique which will be described in detail elsewhere; suffice it to say that the procedure adopted—which, of course, leads to an isotropic gap function—is suitably accurate except possibly at the highest densities. It is to be emphasized that both μ and m^* (effective mass) are k_F -dependent.

At a given c , « Serber » and S -wave results for Δ_{k_F} vs. k_F are basically the same, the former curve being slightly higher than the latter, by an amount which increases with density. Only the S -wave results—which are susceptible to (generally agreeable) comparison with results of earlier calculations—are plotted. It is seen that as the core radius increases, the maximum value of Δ_{k_F} decreases and the gap closes at lower k_F , as would be expected physically. The maximum Δ_{k_F} of symmetrical nuclear matter

is appreciably smaller than that of pure neutron matter for the same potential, the difference *decreasing* with the size of the core. (The difference may be ascribed to the larger effective mass in the neutron-matter case.) In (pure) neutron matter we predict

Fig. 1.

a peak «energy gap» of $2\Delta_{k_F} \simeq 5$ MeV at about one-tenth the equilibrium density of symmetrical nuclear matter, *i.e.* at a mass density $\rho_m \simeq 3 \cdot 10^{13}$ g/cm³, which is a typical density in the inner crust of a neutron star.

The source of the numerical errors corrected above lies (mainly) in a programming error in the original treatment of the gap equation, rather than in the extra term in the original equation (5).

This important reference was omitted from ⁽²⁾:

T. ISHIHARA, R. TAMAGAKI, H. TANAKA and M. YASUNO: *Progr. Theor. Phys.*, **30**, 601 (1963).