The product $I \times D(E_F)$ is greater than 1 for BCC Mn as a consequence of the density of states which is 50% higher than for FCC Mn. This product is comparable to the corresponding product in BCC Fe, and produces a negative uniform susceptibility, an occurrence used by Stoner (1939) and more recently by Janak (1977) to predict ferromagnetism. The negative enhancement at $q = 0$ is interpreted in a similar fashion here for BCC Mn. The pole for $q \neq 0$ is a consequence of the form of the theory and is guaranteed if $\chi(0) < 0$, since $\chi_0(q)$ approaches zero for q large enough.

Since δMn occurs between 1407 K and 1518 K, which is well above the expected Neel temperature, direct verification of its ferromagnetism is not possible (the present work has assumed zero temperature). However it may be possible to observe the magnetic phases at high pressure, in quenched or alloy stablised BCC Mn, or in epitaxially grown BCC Mn layers (Arrott 1987). Since spin excitations have been observed in other magnetic transition metals well above the transition temperature, they may still persist in the γ and δ phases of Mn. High temperature neutron diffraction studies of Mn are in order.

The conclusions about magnetism in Mn are based upon a specific band structure calculation (Papaconstantopoulos 1986). A total energy calculation to determine the equilibrium low temperature lattice constant is under way, as well as band calculations of the assumed ferromagetic phase to search for a magnetic moment.

4. Conclusion

In conclusion, the results of this paper are summarised as follow:

(1) A self-consistent local-density correction has been applied to the RPA susceptibility for the wave-vector dependence of $\chi(q)$ for transition metals near Cr.

(2) Although approximations were necessary, *no adjustable parameters were introduced.*

(3) The wave vector of the spin density wave in Cr is correctly predicted from the pole of $\chi(q)$.

(4) FCC Mn is an incommensurate antiferromagnetic and BCC Mn is ferromagnetic at $T = 0$ K.

(5) A search for spin excitation of (δ, γ)-Mn might prove successful, and by appropriate growth it should be possible to produce ferromagnetic or antiferromagnetic layers or alloys of Mn.

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