Fermi Gas Like Hypothesis for Fleischmann-Pons Experiment

O. E. Rössler, J. Becker, M. Hoffmann, and W. Nadler

Institute for Physical and Theoretical Chemistry, University of Tübingen, Auf der Morgenstelle 8, 7400 Tübingen, West Germany

Z. Naturforsch. **44a**, 329 (1989); received April 14, 1989

Pauli repulsion, which is stronger than Coulomb repulsion, is absent in a gas of bosons. Coulomb repulsion is absent in a gas of fermions whose two Fermi seas are at a low relative temperature (like the free electron gas in a cold metal).

To explain Fleischmann-Pons [1] cold fusion, it would suffice to assume that the deuterium nuclei dissolved in the palladium crystal, which are spin-1 bosons, nevertheless show an absence of Coulomb repulsion the Fermi [1 a] way. This can be achieved by postulating that the bosons are delocalized in the Bloch fashion [2], and that at the same time the properties of a cold Fermi gas apply to the constituent fermions (the protons and neutrons) that make up these composite bosons.

A formal elaboration of this theory is possible. In the meantime we point to a testable implication. By applying a strong magnetic field in conjunction with an RF source (NMR technique), it would be possible to align the spins of the bosons. Hereby these composite bosons will become "doubly polarized" [3] since both subspins are equal. This would suddenly introduce Pauli repulsion amongst all the constituent subparticles, the protons and the neutrons. The cold fusion should therefore come to a virtual stop immediately.

Reprint requests to Prof. Dr. O. E. Rössler, Institut für Physikalische und Theoretische Chemie, Universität Tübingen, Auf der Morgenstelle 8, D-7400 Tübingen.

[1] M. Fleischmann and S. Pons, J. Electroanal. Chem **261,** 301–308 (1989).
[1 a] See: L. Landau, Sov. Phys. JETP **3,** 920 (1957).
[2] J. A. Sussmann and Y. Weissman, Phys. Status Solidi **53,** 419 (1972); Y. Fukai and H. Sukimoto, Adv. Phys. **34,** 263 (1985), Sect. 4.32.
[3] F. Laloë and F. H. Freed, Scient. Amer. **258** (4), 70 (1988).

0932-0784 / 89 / 0400-0329 $ 01.30/0. – Please order a reprint rather than making your own copy.