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Were the Basic Physics Underlying High Temperature Superconductivity Revealed in 1941? PAUL GRANT, W2AGZ Technologies — It is now some three decades since the discovery of high temperature superconductivity by Bednorz and Mueller in 1986. [1] Yet, despite the efforts of dozens of outstanding theoretical physicists and their parent institutions worldwide, and the expenditure of tens of millions of dollars in supporting grants, its detailed BCS pairing mechanism remains a mystery. It is generally believed, and experimentally driven, that some combination of lattice vibrations (phonons) and paramagnetic fluctuations (spinons) are at work. Perhaps a clue to such was revealed by Chauncey Starr in a Physical Review paper published in late 1941.[2] Starr focused on then recent measurements of the paramagnetic susceptibility of several transition metal complexes (see references in[2]), using a model of a coupled spin-phonon dispersion to interpret the experimental results. In this talk, we propose revisiting this paper as a path to resolving the HTSC fermion-boson-fermion pairing enigma, and suggest a possible computational path to pursue.

[1] J.G. Bednorz and K.A. Mueller, Z. Phys. B – Condensed Matter 64, 189 (1986).
[2] C. Starr, Phys. Rev. 60, 241 (1941).

Paul Grant
W2AGZ Technologies

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