

A Laboratory test for Continuum Theory (CT)

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Although CT is based at the sub-particle aether scale, I have shown that most of its implications require large-distance accumulation to become observable. It is suggested that the phenomenon which constrains the temperature limit to which electrical superconductivity is maintained may offer us the chance of testing CT at the laboratory scale, perhaps with a physically startling result.

Keywords: Continuum Theory; superconductivity – high temperature; electron pairing.

1. An Electrical Super-conductivity test for CT

“The mechanism of electron pairing in electrical superconductivity seems to be in need of elucidation. The transition of solids from electrically resistant to superconducting, currently known to as high as 135K, is attributed to the formation of electron pairs (‘Cooper pairs’) of opposite spin (Cooper 1956; Bardeen *et al.* 1957). The accepted picture is that electrons, attracted by the positive field of lattice ions are drawn closer to one another than their mutual Coulomb repulsion would otherwise allow. If energy levels are low enough they are thought then to come together by ‘exchange of virtual phonons’.”

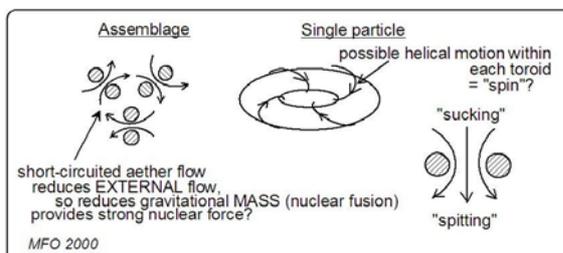


Fig.2. Taking a look inside a finite-sized fundamental particle made of aether. Mass and mutual gravitation as the result of vortical action Inside a particle – gravitational action. On the right is a cross-section of the central image. The mass of a particle or particle assemblage is measured by its (aether-sucking) ability to attract others. On the left, two quarks (= mesons) are unstable ($<10^{-7}$ sec) because aether-circuiting is poor (strong nuclear force is insufficient), but three quarks (protons) are stable, although adding an electron (neutrons) causes instability (10 minutes) in a free state, exposed in randomly moving aether.

“In CT we have the possibility that the electrons are drawn together and held as pairs by mutual aether circuiting in the manner proposed in Fig. 2 for the strong nuclear force and discussed for mesons in that Section. Since the phenomenon of electrical resistivity arises because the masses of the mobile electrons interact mechanically with the lattice, it follows that

resistance would fall to zero if the aether circuiting in the electron pair were so complete that the external aether pumping, and thereby the mass property, of the pair vanished. The CT prediction is therefore that a lump of material will **suddenly become lighter** at the transition to superconductivity, by an amount corresponding to the mass of all the electrons involved in its Cooper pairs. If each atom in the material contributes one conduction electron the fractional change of mass would be about $1/1830N$, where N is the mean atomic number of the material - a surprisingly easily measured quantity. If present it would provide fundamental support for the CT mode of mass generation but if absent it would not undo other relevance of CT.”

[Text reproduced, with editorial permission, from p. 744 of Osmaston 2010]

Note also that another laboratory test for CT was proposed both in that paper and in Osmaston (2013). This involves the deflection of a light beam passing laterally between two long plates when these are charged differentially.

Bardeen J., Cooper L. N., and Schrieffer J. A. (1957) Theory of superconductivity. *Physical Review* **108**(5), 1175-1202.

Cooper L. N. (1956) Bound electron pairs in a degenerate Fermi gas. *Physical Review* **104**, 1189-1190.

Osmaston M. F. (2010) Continuum Theory: Physical Nature Viewed from a Deeper Level; a Rewarding Replacement for SR/GR. *17th Ann. Conf. of the NPA at California State University, Long Beach, June 2010; Proceedings of the Natural Philosophy Alliance*. **7**(2), 720-748. ISSN 1555 4775.

Osmaston M. F. (2013) Implementing Maxwell's aether illuminates the physics of gravitation: the gravity-electric (G-E) field, evident at every scale, from the ionosphere to spiral galaxies and a neutron star extreme. In *The Physics of Reality: Space, Time, Matter, Cosmos: Proceedings of the 8th Symposium Honoring Mathematical Physicist Jean-Pierre Vigièr* (ed. R. L. Amoroso, L. H. Kauffman, and P. R. Rowlands), pp. 388-410. Singapore, World Scientific Publishers, ISBN: 978-981-4504-77-5.

Addendum (August 2017)

From a follow-up ResearchGate exchange Martin Tajmar has cited the following paper of his in which he reported doing just such an experiment and detecting no mass-loss at the superconductivity transition.

Meas. Sci. Technol. 21 (2010) 015111 (7pp)
doi:10.1088/0957-0233/21/1/015111

Measuring the dependence of weight on temperature in the low-temperature regime using a magnetic suspension balance

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Even if this experiment was precise enough to be sure there was no mass loss at all I prefer to look at the matter in another way, without a such a fundamental bearing on CT, but still with some.

Nuclear fusion inside stars is an analogous particle-pairing situation in which mutual repulsion of fundamental particles (but it's protons this time) is overcome and are then held together by the Strong Nuclear Force.

In my EPSC 2013 contribution, ("A fresh look at the Sun...") listed as No 132 on my website, and providing links to both my abstract and full presentation, you will find below Slide 8 my proposal that this process, hitherto known as quantum tunnelling, is actually the action of CT's intensely (at these temperatures) particle-tied randomly moving aether. In the CT context I see Cooper & Bardeen's phonons being replaced by the aether. The aether being a continuum of negative charge, it's motion must be a much more efficient way of driving electrical conduction electrons into intimate contact.

The important matter remaining at issue for CT, raised by an absence of mass loss at the superconductivity transition, is the nature of the electron equivalent of the strong nuclear force. This, as I say in this paper, even if proven by further experiment, is not a matter fundamental to the validity and utility of the rest of CT.

Miles Osmaston.