Quantum Impedances, Entanglement, State Reduction, and the Black Hole Information Paradox

As every circuit designer knows, impedances govern the flow of energy. This is not a theoretical musing. It is particularly relevant in quantum mechanics.

The measurement problem, the mechanism of quantum state reduction, has remained an open question for nearly a century. The 'quantum weirdness' of the problem was highlighted by the introduction of the Einstein-Podolsky-Rosen paradox in 1935. Motivated by Bell's Theorem, nonlocality was first experimentally observed in 1972 by Clauser and Freedman in the entangled states of an EPR experiment, and is now an accepted fact.

Special relativity requires that no energy is transferred in the nonlocal collapse of these entangled two-body wave functions, that no work is done, no information communicated. In the family of background independent quantum impedances [1] this requirement is satisfied by those which are scale invariant - the Lorentz and centrifugal impedances (observed most commonly in the quantum Hall effect) and the far field photon impedance [2].

Impedance matching the electron to the Planck particle reveals the exact identity of the ratio of the electromagnetic and gravitational forces between these two particles and the ratio of their impedances, their relative impedance mismatch [3]. From this one might reasonably conclude that the procedure of quantum impedance matching is valid at the Planck length, at the event horizon of the Planck particle.

Given these two aspects of quantum impedances, that the scale invariant impedances comprise the mechanism of non-local state reduction and that the procedure of quantum impedance matching is valid at the event horizon, then if the holographic principle applies the paradox is removed [4].

1. P. Cameron, "Generalized Quantum Impedances: A Background Independent Model for the Unstable Particles", available at http://vixra.org/abs/1207.0022
2. P. Cameron, "Quantum Impedances, Entanglement, and State Reduction", available at http://vixra.org/abs/1303.0039
3. P. Cameron, "Background Independent Relations between Gravity and Electromagnetism", available at http://vixra.org/abs/1211.0052
4. P. Cameron, "A Possible Resolution of the Black Hole Information Paradox", available at http://vixra.org/abs/1304.0036

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http://www.fields.utoronto.ca/programs/scientific/11-12/CQIQCIV/index.html