Why renormalize if you don't have to?

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While the notion that it is better to avoid renormalization if one possibly can is an easy sell, the possibility that a naturally finite, confined, and gauge invariant quantum model has come over the horizon turns out to be a surprisingly hard sell. This possibility exists if consideration is given to impedance matching, to that which governs amplitude and phase of energy flow, in geometric wavefunction interactions[1].

Most physicists know of the scale *invariant* quantum Hall impedance associated with interactions mediated by the vector Lorentz force. Discovery of this *exact* impedance quantization was awarded the 1985 Nobel prize. Geometry of quantum Hall resistor doesn't matter, only topology. Consequently, invariant impedances cannot be shielded. They include centrifugal, Coriolis, chiral, three-body,...

That scale *dependent* interaction impedances are also quantized is unavoidable. QFT fields are quantized, as is their Compton scale. Associated impedances cannot be otherwise. It is possible to generalize impedance quantization to all forces - electromagnetic, strong, weak, and gravitational[1–4].

Geometric wavefunction interaction impedance networks can be calculated, correlate with the unstable particle spectrum[3], particles appearing and disappearing where impedances are matched.

Mismatches correspond to QED renormalization coefficients. Confinement is the flip side of finiteness. Reflections from mismatches that decouple UV singularity and IR boundary confine fields to the Compton wavelength. And quantum impedances govern phase, explain the origin of gauge invariance.

An electromagnetic impedance model of geometric wavefunction interactions is naturally finite, confined, and gauge invariant. No need to renormalize. The model is simple and transparent, removes paradoxes driving proliferation of quantum interpretations of the enigmatic unobservable wavefunction and its interactions[5].

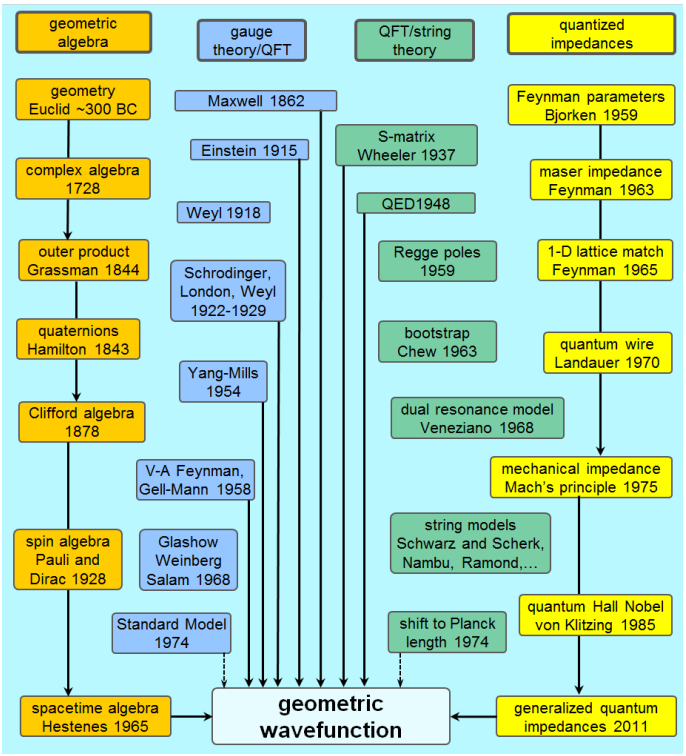

FIG. 1. Historical threads of the geometric wavefunction. Arrows indicate items whose place in the model is in part understood.

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