Two Problems:

1. A solid state boson exciton with a mass of 10^{-9} $m_{electron}$ in well annealed iron. A table top relativistic boson that needs a description. – *work started 1971 to the present*

2. Spherical potential well problem used to describe the diffusion of a proton in compact metals has 3 unexplored solutions at vanishing potentials defining elementary bosons, $m = \frac{\hbar}{\epsilon c}$. *work started in 1973 to the present*

Both threads came together when working on the hydrogen contamination of Columbium in mode change losses affecting Q and proton diffusion isotope effect studies.

John David Jackson helped in getting the first experimental work published and said no one will let you publish the second result even though its accurate. He was correct, but why?
published in Appendix C *Proton in SRF Niobium*

Long Standing Physics Problems

0. Quantum Electrodynamic's questionable foundation - - *Kusch, Cahill, Rabi search for better data 1960s*

1. High energy assumption for effective field theories – *Error by Pauli & Wessikopf 1934*

2. No particle description - - *Realism required by Einstein missing and N. Bohr gambit for blissful ignorance*

3. Integrating relativity into quantum mechanics - - *problem recognized by Dirac 1932 which upset Pauli*

4. Defining quantum spaces - - *John von Neumann playing god, J. C. Maxwell "we only perceive forces"*

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Two spaces need be considered: one where dynamics takes place and one where the particle is created. The question is whether they are the same and the answer to that is not a triviality.

$$\text{Laboratory}(R^3 + 1) \longleftarrow \text{Self-Reference}(C + 1)$$

There is no explicit coordinate transformation defined between the spaces because they are statistically independent. The generated properties are the connection.

Problem:

How do you demonstrate the physical connection of the two spaces?

Produce the differential equations for a particle description in the self-reference frame, both in space and time.

The self-reference frame description is the generator producing the particle properties for the laboratory frame.

Source: co-variant conservation of energy:
$(E - mc^2)(E + mc^2) = c^2p^2 \rightarrowtail E^2 = c^2p^2$

Result: Self-Reference Frame state function $\psi(r,\tau) = u(r)g(\tau)$ where $E = \gamma mc^2$ & n is dimensions.

$$\frac{\partial^2 u}{\partial r^2} + (\frac{n-1}{r} + \kappa\{1 - i\gamma\})\frac{\partial u}{\partial r} - i\kappa^2\gamma u(r) = 0$$

$$\frac{\partial^2 g}{\partial \tau^2} + (\omega_c \mp i\omega)\frac{\partial g}{\partial \tau} \mp i\omega\omega_c g = 0$$

Solutions: one for elementary boson and one for elementary fermion and verified experimentally for the boson.

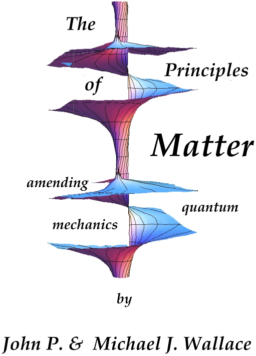
First Results:

0. Boson & Fermion State Functions.

1. Weak
& electromagnetic charge quantization

2. Generates a single handed neutrino
for each massive elementary fermion

3. Generates
a quantized photon and neutrino



4. Generates the electrostatic field, less the singularity

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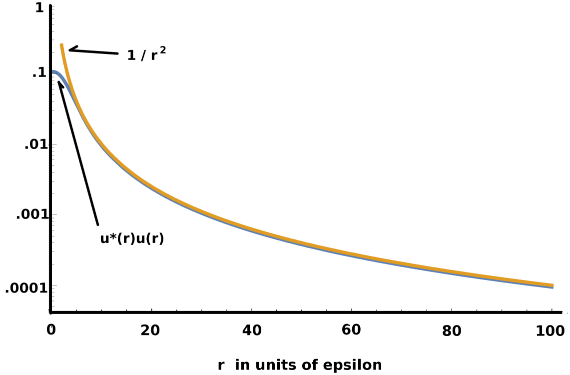

Electrostatic Field: $\mathbf{E}(r) = u^*_{fermion}(r) u_{fermion}(r) \widehat{\mathbf{r}}$

$$\mathbf{E}(r) = \frac{e}{4\pi\epsilon_o}\Gamma[1-i\gamma]\Gamma[1+i\gamma](1+\gamma^2)e^{-2\gamma\ ArcTan(\gamma)}\kappa^2 e^{-2\kappa r}{}_1F_1[1-i\gamma, 2, (1+i\gamma)\kappa r]{}_1F_1[1+i\gamma, 2, (1-i\gamma)\kappa r]\ \widehat{\mathbf{r}}$$

Test $E^o_{10} = < 1S | \int_{\infty}^{r} E(r')dr' - \frac{e^2}{4\pi\epsilon_o r} | 1S >$

Table: **Comparison of the computed first order correction δE_{10} to the difference between hydrogen 1S state ionization energy and the standard 1S level. The effect of the additional neutron in deuterium reduces the measure first order correction to the 1S state significantly.** Experimental data CRC handbook.

Isotope	**Computed 1S** E^o_{10} $\times 10^{-21}$joules	**Measured Correction** $\times 10^{-21}$joules	**Computed** δE_{10} $\times 10^{-21}$joules	**exp./** δE_{10} **%**
^{1}**H**	2178.68640	**1.12447**	1.137269	99%
^{2}**H**	2178.68640	**.985**	1.137269	87%

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Table: **Experimental first order energy correction to the 1S state for as a function of nuclear charge. As Z increases there is a strengthening of the bond.** Experimental data from CRC Handbook.

Z	elements	experimental difference joules10^{-21}
1	^{1}H	1.12447
	^{2}H	.985
2	^{4}He	-4.2
3	^{6}Li & ^{7}Li	-3.5
4	^{9}Be	-12.1
5	^{10}B & ^{11}B	-12.5

Our question about this data analysis is whether it implies that the short range correlations are induced?

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