

# A COMPREHENSIVE DEFINITIVE/PREDICTIVE THEORY OF COLD FUSION QUANTUM RESONANT TRANSPARENCY (QRT) OF COULOMB BARRIERS AND LATTICE-INDUCED NUCLEAR TRANSMUTATIONS (LINT)

by

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Former ERAB Committee Chairman, author of *CF: Scientific Fiasco of the Century*, John R. Huizenga has stated that CF "would be contrary to all understanding gained of nuclear reactions in the last half century," and would require "invention of an entirely new nuclear process" which would require "Three Miracles", namely the "Fusion Rate [low-energy surmounting of Coulomb Barrier," "Branching Ratio," and "Reaction Products" [alleged] "Miracles." Huizenga has performed a public service, in that he stated the orthodox science Establishment's case for finding CF *a priori* "IMPOSSIBLE" with such carefully explicit precision that it is easy to refute his case point-by-point.

In a recent issue of the *American Scholar*, Caltech Provost & Physics professor David Goodstein, while fairly reciting the impressive showing at ICCF-4, concludes that he "quite firmly believes the theoretical arguments that say CF is impossible" (citing his colleagues Koonin & Lewis, whose destructive roles he attempts to portray as benefiting CF 'believers' because informing them of their many unrecognized mistakes, etc.). But reading between the lines of his entertaining essay (& ignoring the revisionist history attempting to whitewash the roles of K & L), it seems to me that he knows in his heart that "the jig is up" and that the twin bastions of anti-CF sentiment, Caltech & MIT, had better start back-tracking or face utter public scorn and permanent historical discreditation.

More constructively, in a recent 57-page review (*Int.J.Theor.Phys.*) of 173 CF theory papers, the quartet of Mario Rabinowitz, Yeong Kim *et al* perform the valuable service of citing explicit flaws in all 25 identifiable categories of theories, and conclude that not a single candidate CF theory merits acceptance.

The theory presented here (in concurrence with the quartet) assumes that by far the most formidable objection is Huizenga's point (1), and addresses it exclusively, in the belief that prior papers by Nobel Laureates Julian Schwinger and Willis Lamb *et al*, taken with a recent solo preprint by Lamb's former collaborator Robert Parmenter, have brilliantly and with exquisite QM & QFT & Nuclear Physics detail exposed Huizenga's points (2) and (3) as the results of mere bad habits, such as 'back of the envelope calculations using Heisenberg's Inequality with wrong-direction inequality sign,' & other cartoonishly incompetent arguments with which complacent 'experts' have become used to indulging themselves.

The present theory *could* (with injustice) be called the Turner-Bush-Bass theory, if I failed to acknowledge the giants upon whose shoulders I stand (and I incorporate ideas which I first learned from F&P, and F&P jointly with Simons & Walling, as well as [early] Hagelstein, Schwinger, Parmenter & Lamb, Chubb & Chubb, Kim *et al*, Rabinowitz & Worledge. This theory is now the ONLY viable CF theory:

1. It *predicts* the strictly *empirical* Schwinger Ratio to within one third of one percent(!), and *demonstrates* why the Schwinger Ratio is 'all important' to CF.
2. It is the *ONLY* theory which *predicts* that a beta-phase deuterided palladium lattice (heavy-water FP cell) will produce CF, while a similarly hydrided palladium lattice (ordinary-water FP cell) will *NOT!* ("Rabinowitz Acid Test.")
3. It is the *ONLY* theory which was submitted in a patent application and a still 'in press' paper in 1991 which makes 7 (SEVEN) experimentally confirmed predictions, *ONLY* two of which were known to me when I submitted the patent, yet then implicitly predicted that ordinary water or hydrogen gas *WOULD* work in nickel.

4. In a privately circulated pre-print, when F&P had only suggested up to 1 kW/cm<sup>3</sup>, it predicted 3 kW/cm<sup>3</sup> before Bush & Eagleton observed that rate of Excess Enthalpy in a thin-film palladium anode plated on silver (closed FP cell).

5. It is the *ONLY* theory which has permitted the explicit numerical computation of the low-energy *Resonant Transparency Spectrum* from first principles QM in *periodic* solid-state lattices, updating *Duane's Rule*; the most important resonances cannot be found without consideration of ALL particles in the lattice, done by *combining* methods of Madelung & Fermi-Thomas/Mott in a *periodic* potential.

6. It is the *ONLY* theory which (via ZPF line-broadening) overcomes the formidable "Breit-Wigner Linewidth" type of objection to the Turner-Bush theory published independently by Jändel and by Rabinowitz & Worledge, the "billion-year tunneling time" which spooked Bush into retracting his own TRM theory at ICCF-4.

7. Therefore it is the *ONLY* theory which garners additional experimental support by predicting the Bush *Fine Structure Spectrum*, or sequentially ascending hill+cusped-valley curves of Excess Enthalpy as function of either cell current or cell temperature, as first observed experimentally by Bush & Eagleton;

8. It early stated explicitly warnings of FP meltdowns (& Gozzi *et al* incipient meltdowns), and is compatible with Schwinger's independently proposed theory of "*chain* fusion reactions" dependent upon *unbroken* linear lattices of barrier-well-barrier chains; thus random imperfections in the actual as opposed to ideal metallic lattice account for the unpredictable evolution in time of many experiments; and so it predicts that *sporadicity* is a function of the *branching ratio* between phonon excitation of the host metallic lattice [FP CF heat] versus the embedded deuteron lattice [heat after death; microbomb fizzles; Pons meltdown).

9. It is compatible with Bush's ICCF-4 explanation of tritium production (low loading) versus radiationless aneutronic Excess Enthalpy by helium-4 creation (high loading), as well as Bush's generalized CAF (Cold Alkali Fusion) and LANT (Lattice Assisted Nucleon Transfer) theories, which explain the Mills-type light-water and Bockris-type neo-alchemy experimental successes, plus predictions of eliminating *ALL* long-lived dangerous radioactive wastes (*without* use of neutron fluences).

10. It illuminates that what is really important is not the host lattice but the embedded deuteron lattice, therefore suggesting that solid meta-stable room-temperature-&-pressure *crystalline MSD* (Meta-Stable Deuterium), manufactured via Bass's patented Plasmasphere<sup>tm</sup> Process & patent-pending Metamatter Process (for putting fully ionized plasmas into the state of a liquid metal, prior to magnetic levitation in a refrigerated vacuum for cooling), will provide *micro-pellet* radiationless aneutronic cold fusion (triggered by my patent-pending QRT<sup>tm</sup> Process).

ITEMS \CF AUTHORS	Bass	Bush	Chubbs	Kim	Parmenter	Rabinowitz	Schwinger	Turner
<b>ZPF/LV</b> (Zero Point Fluctuations & Lattice Vibrations, rms <u>amplitude</u> $\Lambda$ for bound nuclei)	X	X	X	X	X	X	X	X
<b>Schwinger Ratio</b> $\Sigma = L / \Lambda$ , embedded Lattice Period $L$								
Conjectured Definitive Significance of $\Sigma$							X	
Provided $\Lambda$			X					
First Principles Derivation, <u>Validated</u> $\Sigma$ Predictn.	X							
<b>Phonons:</b> Heat Mediation & Inverse-Mossbauer-Effect Ion Excitation & De-excitation	X	X	X		X		X	
<b>Chain Fusion</b>	X						X	
<b>QRT</b> Ion Excitation: Resonant Non-Elastic Collision Criterion ( $\Sigma/\pi = \text{ODD}$ integer)	X	X						
<b>Globally Valid Potential</b> $V(r)$ : OK near collision	X		X	X	X	X		
<b>Velocity Distribution</b>								
Fusion Rate Enhancement				X	X			
Resonant Line-Broadening	X	X						
<b>Periodic</b> $V(r) = V(r+L)$ in Solid-State Lattice	X	X	X			X		X
<b>Floquet-Bloch</b> Theorem: $\text{grad}(\log(\psi))$ <u>Required</u> Spatially Periodic of Lattice Period $L$	X	X	X					X
<b>Effective Delta-Mass:</b> from Periodic $V(r)$					X	X		
<b>Electron Screening:</b> Fusion Rate Enhancement	X		X	X	X	X	X	
<b>Madelung Forces:</b> Fusion Rate Enhancement	X		X		X		X	
<b>3-D</b> Mossbauer Analysis			X		X			
Conduction Electrons in Host Lattice $\Rightarrow \Lambda$	X		X		X			
<b>Duane's Rule:</b> for Inelastic Collisions & Resonant Transmission	X	X	X					
Excitation Energy Levels for <b>Resonant Transparency</b> of Coulomb Barrier	X	X			X			X
<b>Nuclear Well</b> Considered	X				X			
<b>Heat vs Loading</b> Prediction		X						
<b>Heat vs Current</b> Prediction (Bush TRM Fine Structure)	X	X						
<b>QRT:</b> Host-Lattice OK for Deuterons vs Protons <u>Validated</u> Predictions!	X							