Masterful riposte by Widom-Larsen theory coauthors (Widom & Srivastava) and Swain Invalidates the erroneous criticisms of Maiani *et al.* and Reaffirms correctness of our 2006 *EPJC* estimates for neutron production rates

"Electron capture in a fully ionized plasma"

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arXiv:1409.5344v1 [hep-ph] September 17, 2014

http://arxiv.org/pdf/1409.5344v1.pdf

Abstract:

"Properties of fully ionized water plasmas are discussed including plasma charge density oscillations and the screening of the Coulomb law especially in the dilute classical Debye regime. A kinetic model with two charged particle scattering events determines the transition rate per unit time for electron capture by a nucleus with the resulting nuclear transmutations. Two corrections to the recent Maiani *et.al.* calculations are made: (i) The Debye screening length is only employed within its proper domain of validity. (ii) The WKB approximation employed by Maiani in the long De Broglie wave length limit is evidently invalid. We replace this incorrect approximation with mathematically rigorous Calogero inequalities in order to discuss the scattering wave functions. Having made these corrections, we find a verification for our previous results based on condensed matter electro-weak quantum field theory for nuclear transmutations in chemical batteries."

Selected excerpts:

"In recent years we have been working on electroweak interaction inverse beta decay by including electro-magnetic interactions with collective plasma modes of motion[1, 2]. We have applied this theory to electron capture in a water plasma to explain observed nuclear transmutations on the cathode surface of a chemical cell[3]. While the original theory was formulated in terms of electro-weak quantum field theory[4] in a many body context, a reasonable alternative relies on physical kinetic plasma theory[5{8] to describe a water plasma. The theoretical kinetic model gives rise to electron capture rates per unit time per unit cathode surface area in a water plasma in agreement with the quantum field theoretical model and is in agreement with experiments."

"Most recently it has been predicted by the Rome group, Maiani et.al.[12], that a cold plasma has a higher rate of electron capture than does a hot plasma. This has been predicted by Maiani on the basis of (i) the Debye screening of the attractive Coulomb interactions between the electron and the proton and (ii) by the quasi-classical WKB approximation to the s-wave electron-proton wave function. The prediction is in flagrant disagreement with experiments which exhibit a hot water plasma nuclear transmutations and do not exhibit such transmutations in a cold plasma. The Maiani computation fails theoretically because (i) The Debye screening length is applied in regimes wherein it is clearly invalid and (ii) the WKB approximation is applied in the long De Broglie wave length regime but in reality the WKB approximation is valid only in the short De Broglie wave length regime. One of our purposes is to correct the errors made by Maiani When the properly rigorous mathematics is applied we recover our previous and correct results."