

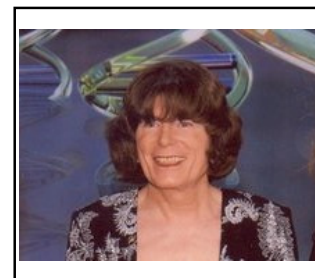
Isotope Effects beyond the Electromagnetic Force: ^1H and ^2H in Palladium Exhibiting LENR

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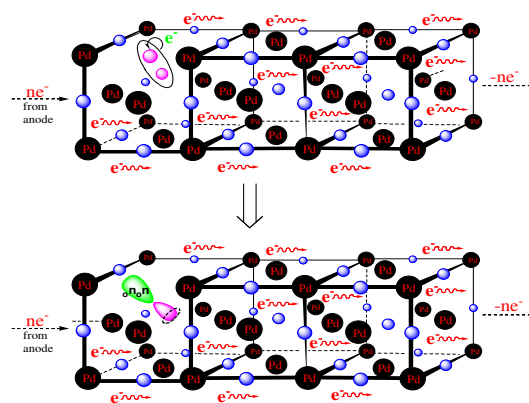
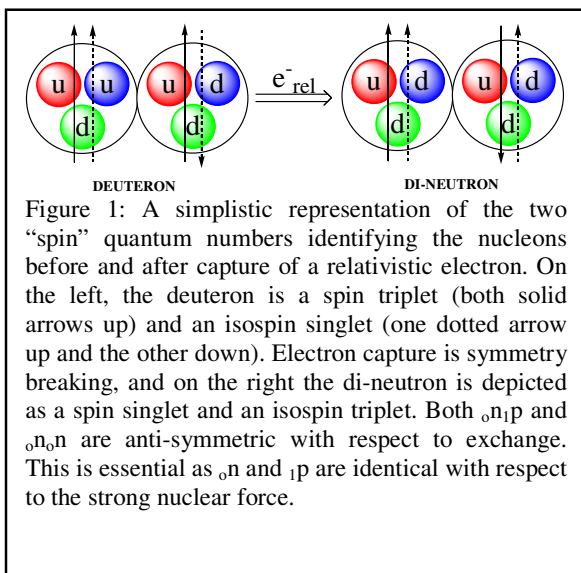
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A mechanism is presented concerning electrolysis of deuterated water with a palladium cathode that is infused with deuterium (palladium deuteride) resulting in the formation of small amounts of radioactive tritium, excess energy (more than allowed by EMF chemistry alone) and the concomitant liberation of ^4He . This net electron catalyzed nuclear chemical reactions ($^2\text{H} + ^2\text{H} + e^- \rightarrow ^4\text{He} + e^- + \text{heat}$) and ($^2\text{H} + ^1\text{H} + e^- \rightarrow ^3\text{H} + e^-$) appear to be a result of respectively four and three isotope effects [1] acting in combination with each other in a non-linear (chaotic) fashion to produce a metastable nuclear isomer of hydrogen-4 or hydrogen-3. The four isotope effects begin with the influx of electrons into the $-\text{Pd-D-Pd-D}-$ Bravais lattice conduction band and consequent preferred rupture of Pd-D bonds (over those of Pd-H) in the cathode liberating D_2 . This is followed by the newly freed deuterium capturing an electron yielding a di-neutron (${}_0n_0n$). The ${}_0n_0n$ then reacts with a deuterium or hydrogen (from protic impurity in the lattice) via phonon enforced quantum tunneling resulting in ^4mH or ^3H respectively. The ^4mH quickly undergoes nuclear internal conversion to form ^4He . These reactions involve the weak force, but they take place in simple electrochemical systems that are normally thought of in terms of the electromagnetic forces only.[2] The combined influence of the four isotope effects explains thousands of, what were considered, anomalous observations by top electrochemical researchers.[3] The newly described

mechanistic effects involve a very important and almost forgotten intermediate (the di-neutron).[4]



with a single electron in close proximity.

[1] C. D. Stevenson, Annulenylenes, annulynes, and annulenes, *Acc. of Chem. Res.* 40, 8, 703–711, **2007**.

[2] A M. Fleischmann, S. Pons, M. W. Anderson, L. J. Li, M. Hawkins, Calorimetry of the palladium-deuterium-heavy water system, *J. Electroanal. Chem. Interfacial Chem.* 287, 2, 293–348, **1990**.

[3] M. McKubre, F. Tanzella, P. Tripodi, Evidence of d-d fusion products in experiments conducted with palladium at near ambient temperatures, *Trans. Am. Nucl. Soc* 83, 367, **2000**.

[4] H.-W. Hammer, S. Konig, Constraints on a possible dineutron state from pionless EFT, *Phys. Lett. B* 736, 208–213, **2014**.