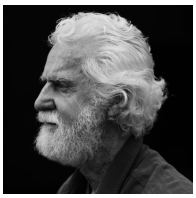
A Deuteron Plasma Driven to Neutrality and ^{4}He



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Old recovered data of 20 KHz cavitation experiments, where free electrons and deuterons that implanted into metal target foils, TF, of Pd and Ti, were measured for ^{4}He atoms. The activity occurs in sub-picosecond timeframes at ~10^{o}K that effectively limit activity to the surrounding mobile electrons in the D^+ Meso Clusters, MC. The systems that were measured in cavitating D_2O, ranged in frequencies from 20 to 1600 KHz. The positive ^{4}He mass spectrometry, MS, results can be explained by postulating a squeezed existence of implanted charged particles in the MCs. These focusing and compressing free electrons squeeze and neutralized the MC plasma. This environment was close to that of the Recombination Epoch, which is "The universe after 380 thousand years of cooling". Electrons could finally unite with protons forming H. In our experiment, e- + D^+ was the 1driving force. The probability of D atom formation becomes greater than zero as MC cools, producing the ignition shockwave, SW. The production of one atom of ^{4}He was related to D ionization potential of 15.5 eV. The MC generates in its space-time a high-density fast pulse SW that ignites an MC DD fusion event much like the space-time of muon molecule Ddμ fusion, where a comparison can be made. [1] The energy density pulse of the MC shockwave pulse was much greater than the molecular muon fusion pulse Ddμ. See table. These numbers are estimates but express the magnitudes for the comparison of D+ + e- SW with the slower pulse of the Ddμ molecule.

SINGLE EVENT POWER PLUSE COMPARISON P = dE/dt = F*v

VALUES	MC SHOCKWAVE		Dd*μ* MUON
Energy in Joules	2.48E-18		3.81E-12
Active radius in meters	8.00E-15		8.00E-13
Volume of fusion activity	2.33E-42		2.33E-36
E/V Ratios J/m3	1.06E+24		1.06E+24
Pulse capture time sec	5.00E-14		1.00E-08
Power pulse J/(m3*t)	2.13E+37		1.06E+32

This paper explores the paths of TFs BCC and FCC unit crystals that followed different ^{4}He paths regarding trapped ^{4}He in Ti and ejected ^{4}He in Pd. 1) Ti TF lattice, BCC, showed no SEM photo evidence of small surface ejected craters, but an MS of the melted foil pieces showed by MS were trapped ^{4}He in the Ti TF. [2] 2) Pd TF FCC lattice, showed many small surface ejecta craters, ejected MS, in SEM photos, but the MS of melted pieces of Pd TF lattices showed no significant trapped ^{4}He.

[1] Kanetada Nagamine, Introductory Muon Science, 1st-ed edition, Cambridge University Press, New York, pp.80-87, 2003.
[2] R. Stringham, Helium Measurements from Target Foils, LANL and PNNL, 1994, JCMNS, vol. 24, Proceedings ICCF20 Sendai, Japan, Oct 02-07, 2017.