MESO-MOLECULES FORMATION IN ULTRA-DENSE FAST IGNITION ICF PLASMAS

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Multi-MeV and ultra-intense relativistic electron beams (REB) allow to revisit the meson-catalysis scenarii with innovative breakthrough potentialities.

For instance, REB with 150 MeV could easily electrodisintegrate DT fuels into 2 or 3 nucleons with the production of a negative pion (NP). This NP stopped down to rest within the compressed and very dense plasma may then forms exo-atoms with D or T ions, through a 2-body radiative process, and the resulting exo-atoms thanks to their polarizability and electric dipole will also be able to attract a D or T ion to form an exo-molecular hydrogen ion. Nuclear scattering lengths secure an overwhelming nucleus-nucleus interaction compared to the NP-nucleus ones.

Then, the usual and cold hydrogen catalytic cycle could be efficiently supplemented at a speed a thousand time faster by a much cheaper one while the hot and very dense plasma surrounding would secure a nearly negligible NP or muon sticking on the alpha particles issued by the fusion process.

A scheme very similar to this fast ignition one can also be envisioned for the fully ionized DT fuel in a warm dense matter context.