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H-11B Fusion Reactor with Extreme Laser Pulses for non-LTE Igniton

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The progress for the design of a reactor for laser boron fusion is following a road map [1] based on the use of extreme deviations from local thermal equilibrium LTE conditions by using just available picosecond laser pulses of more than petawatt PW power. Fusion of hydrogen H with the boron isotope 11 (HB11 fusion) at LTE is extremely difficult. For spherical compression with lasers, densities 100,000 times of the solid state and temperatures above 100 keV are necessary, such that the energy gains are about five orders of magnitudes below the usual DT fusion. The necessary non-LTE ignition condition is possible if the equation of motion is determined by the electric and magnetic fields E and H of the laser such that the gas dynamic pressure is only a small perturbation. The nonlinear (ponderomotive) force calculations of 1978 [2] resulted in ultrahigh accelerations, measured by Sauerbrey [3] as predicted. With the present ps extreme laser pulses, the measured [4] nine orders of magnitudes higher energy gains from HB11 can be explained with inclusion of the avalanche reaction due to the generated three 3 MeV alphas at each reaction [5]. Combining these results with the kilotesla magnetic fields [6] for cylindrical trapping of the reaction in solid density HB11 fuel ignited end-on by the petawatt laser pulse, shows how 14 milligram of boron produces 300 kWh energy in nearly equal energetic 3 MeV alphas. The reported steps for the design of the reactor follows the parameters [1] for energy genertion with no problems of nuclear radiation producing low cost electricity.
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