Proton-Boron Fusion Reaction by Laser Driven Coulomb Explosion

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Abstract

A scheme of proton- boron fusion is investigated, where a boron cylinder is filled with hydrogen gas or hydrogen adsorbed carbon nanowires. A laser is line focused on the gas (by an axicon) converting it into tunnel ionised plasma. The ion Coulomb explosion of the plasma produces MeV ions, which when hit the boon cylinder undergo proton-boron fusion, ${}_5B^{11} + {}_1p^1 \rightarrow 3_2\alpha^4 + 8.7MeV.$ Energy estimates reveal that the scheme requires laser intensity $I_L \sim 10^{19} W/cm^2$ at $1\mu m$ and boron cylinder needs to be converted into the plasma state to overcome Coulomb scattering of protons. The protons generated with energy about 600 KeV, which is sufficient energy to stars the proton - boron fusion reaction.