On aneutronic proton–boron fusion in oscillating plasmas

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The first experiments on the aneutronic proton–boron (pB) reaction of fusion $p + {}^{11}B \to \alpha + {}^{8}Be^{\star} \to 3\alpha + 8.7$ MeV in an oscillating plasma of nanosecond vacuum discharge (NVD) as well as simulations related in the electromagnetic code KARAT were presented earlier [1]. The formation of a virtual cathode in the anode space of NVD and a corresponding potential well (PW) with a depth of 100 kV provides the acceleration of protons and boron ions to energies of hundreds keV, when the yield of the pB reaction near the secondary resonance energies (150 keV) becomes noticeable. In the process of ion oscillations in PW, head-on collisions of protons and boron ions with energies of 100–500 keV lead to a proton–boron reaction and the appearance of particles [1]. In this work, the yields of-particles in previous [1] and further pB fusion experiments under different parameters are simulated and presented. Some features of plasma oscillatory confinement in NVD as a relatively new type of inertial plasma confinement are discussed [2, 3].

[1] Kurilenkov Yu K, Oginov A V, Tarakanov V P, Gus' kov S Yu and Samoylov I S 2021 *Phys. Rev. E* **103** 043208

[2] Kurilenkov Yu K, Tarakanov V P, Oginov A V, Gus'kov S Yu and Samoylov I S 2023 *Laser Part. Beams* **2023** e9

[3] Andreev S N, Kurilenkov Yu K and Oginov A V 2023 *Mathematics* **11** 4009