Plans of p-[11]B fusion study on an ENN spherical torus

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Since 2018 ENN has been working towards p-[11]B fusion on a spherical torus. The EHL-2 is a next-step design by the ENN Energy Research Institute to test p-[11]B fusion reactions. Its technical goals are to reach electron densities up to $n_e = 1.3 \times 10^{20}$ m^{-3}, ion temperatures up to $T_i = 30$ keV, $n_B = (0.05 - 0.1) \times n_i$, a plasma current of 3 MA and toroidal field of 3 T at a major radius of 1.05m. More than 10^{15} alpha particles per sec can be produced in such a plasma; their detection and characterization will shed first light on the properties of such plasmas. A combination of auxiliary heating and current drive power of 34 MW is assumed, including up to 20 MW hydrogen NBI at above 200 kV energy. Numerical simulation of beam-plasma target p-[11]B reaction is in progress, in step with the orbit losses of the fusion produced energetic alpha particles, providing basis for energetic α particle detection designs. The p-[11]B fusion cross sections are being updated with the latest beam-solid target experiments.

Key words: MCF; p-B; EHL-2; ST;