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Optimization of a Gas Dynamic Trap Neutron Source

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Fusion development will require materials capable of withstanding the harsh bombardment of 14 MeV D-T neutron bombardment. The Gas Dynamic Trap (GDT) neutron source concept is aimed to test and qualify suitable materials and sub-components. In this paper we evaluate two ways to further increase the attractiveness of the neutron source suggested by the GDT team.. First is the use of ECH power to reduce the neutral beam injection power required to heat and sustain the warm plasma. Second is the use of an additional coil on each end to reduce the power and particle end leakage. These two ideas will increase the electron temperature and thereby increase the neutron output. In addition, these ideas also reduce the gas throughput and thereby reduce the size of the tritium reprocessing system and reduce the number of neutral beam injectors subject to neutron exposure. We benchmark our ideas and modeling to GDT experiments as well as earlier experiments.

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