Abstract Submitted
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Compact, Energy Self-Sustaining Neutron Source: Enabling Technology for Various Applications[1] ADY HERSHCOVITCH, W. HORAK, B. JOHNSON, M. TODOSOW, T. ROSER, BNL, M. DRISCOLL, MIT — In this novel neutron source, a deuterium beam (energy of about 100 keV) is to be injected through a Plasma Window into a tube filled with tritium gas or tritium plasma to generate D-T fusion reactions whose products are 14.06 MeV neutrons and 3.52 MeV alpha particles. At the opposite end of the tube, the energy of deuterium ions that did not interact is recovered. Energy recovery is close to 100%. Mo and Nb walls of proper thickness will absorb 14 MeV neutrons and release 2 – 3 low energy neutrons. Each ion source and tube forms a module. Larger systems can be formed from multiple units. Beam propagation can be further enhanced with vortex stabilized discharges, electron beams in opposite direction (with energy recovery) or magnetic fields where possible. Unlike current methods, where accelerator based neutron sources require large amounts of power for operation, this neutron source will generated enough power to compensate for the power required to generate the ion beam. Concept description and basic calculation will be presented. Among possible applications for this neutron source concept are sub-critical nuclear breeder reactors and accelerator transmutation of radioactive waste.

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