Inertial electrostatic confinement fusion neutron source with an externally applied magnetic field

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The purpose of this research is to develop a compact neutron source. Neutron can be generated by a nuclear fusion reaction. Inertia electrostatic confinement fusion (IECF) is one of the compact neutron sources by using a nuclear fusion reaction. Characteristics of the IECF are compact, monochromatic energy (2.45 MeV for D-D nuclear fusion reaction) and high controllability. In this research, a compact neutron source by a high voltage ring cathode discharge has been developed. Schematic drawing of the neutron source is shown in figure below. The used gas is deuterium. Deuterons in the discharge around the ring cathode are accelerated to the centre of the ring cathode and are converged by the high voltage. Such deuterons collide each other and the fusion reaction occurs around the centre of the ring cathode. The estimated neutron fluence rate is approximately 5 cm⁻² s⁻¹ at the distance of 350 mm under the condition that the cathode voltage is -30 kV and discharge current is 8 mA. As new experimental results, the increase of the neutron fluence rate by applying a magnetic field will be reported in this presentation.

![Schematic drawing of a compact neutron source using externally applied magnetic field](image-url)