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Staged Z-Pinch as High Flux Neutron Source For Mo99 Production

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ABSTRACT

A new approach for production of Mo-99 is proposed based on thermonuclear fusion neutron activation in staged Z-pinch (SZP). The SZP is comprised of a high-Z plasma liner imploding onto a low-Z, fusion fuel, driven by a high-current pulsed-power device. Evidence suggests that thermonuclear neutrons with a yield larger than 10^{10} per shot were produced in small-scale experiment configured with a SZP target at ZEBRA facility of 1MA. Continuing study provide a physics foundation for the SZP and its potential to achieve higher neutron yields larger than 10^{14} for deuterium target and 10^{16} for deuterium-tritium mixed target from 10MA generator based on LTD technology. Hence, further development and implementation of this concept will allow us to build a powerful neutron source for the production of Mo-99 without using Highly Enriched Uranium (HEU). We will present basic concept and path forward for production of different radionuclides with particular emphasis on Mo-99.