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## Development of a 750kJ Dense Plasma Focus for Radiation Test Applications

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We present initial test results and design considerations for a Dense Plasma Focus (DPF) device designed and built by Verus Research for the next generation of neutrons for Test and Evaluation applications. The DPF concept, developed in the late 1950's, was used in part as a method of investigating plasma physics phenomena. The neutron radiation generated from a DPF can be used for multiple purposes, including investigation into short-pulse radiation source capabilities or material properties. The Verus Research DPF utilizes a 750kJ capacitor bank discharged through a coaxial anode-cathode assembly, with a high-pressure backfill gas of >10 Torr deuterium, to generate a high-flux neutron pulse on the order of 100 ns. Optimization and development of the system to maximize yield while achieving a repeatable and reliable system is presented. The initial testing of the DPF uses a drive voltage up to 50 kV generating a total current of 3 MA. A maximum current of 3.6 MA at 60 kV is expected in our configuration. Test results indicate yields  $>8 \times 10^{11}$  neutrons per pulse. This report focuses on test configurations that further increase yield while improving reliability and repeatability. Methods of neutron detection, calibration and associated quantification challenges are also discussed. Results on the variations of pressure and geometry are presented as well as other variations that impact the individual yield per shot or general reliability concerns.

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