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Development of a Low Energy Compact and Portable Plasma Focus Neutron Source

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We have developed a portable plasma focus neutron source of 302 J energy operated by a single Maxwell capacitor (20 μ F, 6 kV). The device is mounted on the capacitor through a ground coupling cup leaving an air gap between the anode bottom and charging terminal of the capacitor for energy transfer to the system. The device together with the capacitor has a diameter of 10 cm, height of 37 cm and a weight of 3.78 kg. It is capable of delivering a neutron yield of the order of 10^5 neutrons per pulse with Deuterium as fuel gas. The FWHM of the neutron pulse is around 30 ns. The anode used as a feed through is composed of a kovar rod brazed with Alumina insulator sleeve which is further brazed with a rotatable kovar flange. The anode feed through is coupled to the vacuum chamber and cathode through a copper gasket. For a single gas fill the device had a shelf life of 3000 shots recorded over a period of three years. Afterwards the yield was gradually deteriorated due to the deposition of sputtered kovar material on the insulator sleeve. However with a fresh gas fill the device is still serving as a source of neutrons in the lower edge of 10^4 neutrons per shot.

Country or International Organization

Pakistan

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