PRELIMINARY RESULTS OF A VERY FAST, LOW PRESSURE THETA PINCH EXPERIMENT

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Abstract

To study the effect of a very fast compression in the theta-pinch an extremely low-inductive, 115 kJ condenser bank with crowbar was constructed. With a divided coil (l = 14 cm, d = 7 cm) and working at 2 x 4o kV the induced field after ignition is 3,5 kV/cm at the inner surface of the discharge tube. The compression field rises within 1,7 µsec to 22o kΓ .

Preionization is performed by a z-pinch driven at 12o kV by a single current pulse.

First experiments were carried out at a voltage of 2 x 3o kV with D_2 at 1o µ filling pressure. Per discharge about 10^8 neutrons are produced over a time of 2 µsec. Spectroscopic measurements of the continuum in the visible show that the neutron flux corresponds to a plasma having a mean deuteron energy of about 9 keV. The duration of the neutron pulse at the small length of the compression coil and the time behaviour of the continuum intensity indicate relatively small end losses. It is, therefore, supposed that as a consequence of the fast implosion the deuterons have mainly a two-dimensional velocity distribution perpendicular to the coil axis. Results of further measurements shall be reported.