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Spectroscopic Electron Temperature Measurements of Plasma in a Theta Pinch Device

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An experimental investigation of electron temperatures in helium plasma produced by a theta pinch was described.

The experiments were performed under the range of the initial pressure from 10 to 200 m Torr and the primary discharge energy of 5 KJ.

A break-down was found to start at the second half-cycle of discharge and the peak value of magnetic field of that time was 15.3 KG.

The electron temperatures were measured spectroscopically by observing the relative intensities of the two spectral lines, 2^3P-4^3S(4713 Å) and $2'P-5'D$(4387 Å). The electrons were heated to about 20 eV at the center of the coil

When the concerned system was in thermodynamic equilibrium, the results of measurements agreed with those of qualitative analysis due to both snow-plow model and adiabatic compression model in the range from 37 to 100 m Torr. The axial contraction of the plasma was also observed by means of a high speed camera and photomultipriers.

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