Experimental investigations of hotspots in a low energy plasma focus operating in hydrogen-argon mixtures

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Abstract

We present experimental results on the investigation of hotspot formation in PFP-I, a small 3.8 kJ plasma focus device operating in hydrogen-argon mixtures, at pressures from below 0.2 torr upward. A combination of multipinhole and slit-wire X-ray photography is used to measure the characteristic size and temperature of the hotspots, over a range of pressure and gas mixing ratios. Filtered p-i-n diodes and a beam-target detector are used to investigate the time evolution of the hotspots. Typical size for the hottest emitting region, at temperatures between 200 and 400 eV, is found to be around 150 /spl mu/m, with a typical duration of the high temperature phase of the order of 10 ns. In general, the temperature in the final phase of the time evolution of the hotspots reaches values which are nearly twice those of the plasma column where they are formed. Characteristic size of the hotspots is about half of that of the initial plasma column.