ANGULAR DISTRIBUTION STUDY OF HARD X RAY EMISSION IN DIFFERENT ANODE STRUCTURE BY APF PLASMA FOCUS DEVICE

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As it shown in fig.1,the experiments are performed in APF Mather type plasma focus facility, which is powered by a 36μf capacitor bank, operating at 16 kV[1,2]. In spite of considerable research works on HXR radiated by plasma focus devices, a complete discretion of HXR signals require more experiments[3]. To study the anisotropic behavior of HXR radiated by the device, intensity of HXR signals along the anode bar and also around the Al and W anode tips investigated. The first detector was fixed and served as a reference, whereas the second detector measured the HXR intensity at 0^o, $\pm 22.5^o$, $\pm 45^o$, $\pm 67.5^o$, and $\pm 90^o$from the fixed detector in an axial plane. The fast plastic scintillator detectors after calibration placed at the distance of 1 m from the top of anode tip[4]. At each angular position of detector 25 shots was made. In comparison with the hollow anode tube the HXR signals obtained from flat and especially conic W inserts nearly tending to have the same intensity along the axis of the device. The sheath with W anode tip had the lowest impurity, while that Al anode tip had the highest high Z impurity content. This means that the employment of a convenient shape of anode tip result to more isotropic emission of HXR. The observed anisotropic angular distribution of the HXR from the device appears to show that the mechanism for the production of these X-rays might be bremsstrahlung from a directed beam of accelerating electrons. Dependence of intensity and anisotropy of HXR signal on anode tip geometry and its material indicate that their origin isn't due to a simple mechanism and we should design a special anode bar for any experimental setup of DPF related to HXR signal.

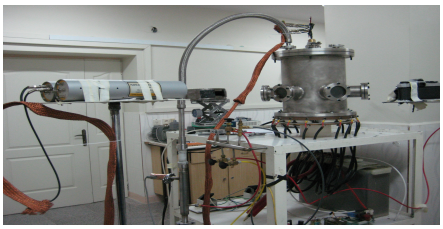

Fig.1. a picture of APF plasma focus device

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3- Newman C. E., Pertocian V., Production of hard X rays from plasma focus, The physics of fluid, 18, 5, 547-551(1975)
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