

## Long-pulse ion source for plasma diagnostics in magnetic fusion devices.

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Spectroscopy of neutral beam induced radiation is widely used in magnetic fusion devices for measurements of density and temperature profiles, studies of plasma turbulence and cross field transport as well as for measurements of the radial profiles of highly ionized impurities. In order to access the plasma core, the diagnostic neutral beam should be of sufficiently high energy and current density. Its transverse dimensions and angular divergence are to be small enough to obtain the required spatial resolution. This paper reviews the status of ion source especially developed for application to plasma diagnostics in magnetic fusion devices. The source parameters were chosen to meet given above requirements to diagnostic beams.

The developed source is capable of providing the equivalent hydrogen beam current of upto 1A incident on the plasma, with beam energy set at 50 keV. An angular divergence of the beam is about  $1^{\circ}$ . The source operates in a long pulse mode (upto 10s) with possibility of 500Hz beam modulation.

The plasma emitter for the ion source was developed in two versions: an inductively excited RF-discharge or arc discharge plasma source. The beam is extracted and accelerated by a four-electrode ion-optics system with the circular apertures [1,2]. The results obtained with the different plasma sources are discussed in the paper.

### Referencies

- [1] Davydenko V.I. et al, Proc. 18th Symp. Fusion Techn., Karlsruhe, Germany (1994), p.601
- [2] Davydenko V.I. et al, Rev. of Scientific Instr., Vol.68, No.3, 1997, pp.1418-1422