POSSIBILITIES TO INCREASE RF ION SOURCE PLASMA DENSITY

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The possible ways of increasing plasma density in RF ion sources to obtain higher beam brightness are reviewed. Plasma density increase is achieved by initiating an efficient RF discharge in an external magnetic field. Longitudinal magnetic field is generated by a compact magnet system with permanent magnets and ferrites of circular shape. In the source an RF discharge is set up with an external magnetic field of ~40 G and argon plasma density of $3 \cdot 10^{11}$ cm^{-3} for RF power input into the plasma of 40 W (f_{RF} = 27,12 MHz). The ion current density inside an extracting electrode in the source is 10 mA/cm^2 for an emission hole diameter of 0,6 mm. Measurements of the current value and current profile were performed with ion source testing equipment permitting measurements of the current, emittance, mass composition, ion beam energy spread, and RF power input into the plasma.