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# Low-energy dc ion source for low operating pressure

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We report on an experimental study of an ion source based on a Penning discharge with a cold hollow cathode in crossed electric and magnetic fields. The minimum vacuum chamber operating pressure was  $3 \times 10^{-5}$  Torr for argon and  $5 \times 10^{-5}$  Torr for hydrogen. The use of a hollow cathode allowed decreasing the discharge operating voltage down to 350 V at a discharge current of  $\sim 100$  mA. At a discharge current of 100 mA and beam accelerating voltage of 2 kV, the ion current was 2.5 mA for argon and 8 mA for hydrogen, and the ion beam on-axis current density 170 and 450  $\mu\text{A}/\text{cm}^2$ , respectively. The current-voltage characteristics of the discharge and the radial ion beam current density distribution were measured. The influence of pressure on the discharge parameters and their time stability was investigated.

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