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**Experimental study of large diameter Penning discharge plasma anode for HCPEB source**

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The large diameter Penning discharge was designed to produce pulsed plasma used in a high current pulsed electron beams source. The cylindrical anode of diameter 80 mm and height 30 mm was powered by a pulse voltage of ~5 kV. The plasma discharge characteristics were investigated. The results show that the plasma discharge goes through an activation stage and a high current discharge stage. With the higher working pressure and magnetic field intensity, the Penning discharge operates more quickly and steadily of time accuracy under  $\pm 0.5 \mu\text{s}$ . The peak discharge current increases with the anode voltage. The optimized parameters were selected as working pressure  $7 \times 10^{-2}$  Pa, anode voltage 5 kV, magnetic field 2000 Gauss and ballast resistor 200  $\Omega$  for the HCPEB emission.

**Keywords**

Penning discharge plasma

High current pulsed electron beam source

Magnetic field

Anode voltage

Working pressure