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The Effect of Different Bias Application Methods on the Plasma Parameters of the Extraction Area

The suppression of co-extracted electrons has always been one of the key problems in the operation of negative ion sources, as the co-extracted electrons not only cause energy waste, but also create a great heat load on the extraction grid (EG). A positive bias is usually applied to the plasma grid (PG) to reduce the co-extracted electron current. There are several ways to connect the bias voltage, as the BP, PG, and expansion chamber are insulated from each other, such as between the bias plate (BP) and expansion chamber, between the PG and expansion chamber, between the PG and BP + expansion chamber (the BP and expansion chamber have the same potential), and between the BP and PG. In this paper, the effects of different ways to connect the bias voltage on the plasma parameters in the extraction area are studied by using an electrostatic probe. Finally, the optimal way to connect the bias voltage is obtained, and the reason for the optimal bias voltage connection is analyzed.

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