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HVE Ion Sources for Medium and High-Energy Accelerator Systems

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Since decades, High Voltage Engineering (HVE) manufactures particle accelerator systems for research and industry. HVE's product line includes Singletron and Tandetron accelerator systems with terminal voltages of up to 6 MV. They are dedicated to a wide range of applications, including ion implantation and irradiation, Ion Beam Analysis (IBA), Accelerator Mass Spectrometry (AMS), and neutron calibration. In this paper, we give an overview of the different positive and negative ion sources that are applied in these systems.

We focus especially on the recent development and the performance of a compact 2.45GHz permanent magnet ECR bipolar ion source (HVE Model SO-160), used for negative light-ion injection into tandem accelerators. It generates high-current, low-emittance light-ion beams at 30 keV energy. The novelty in the design of this ion source is that it combines direct negative extraction for H⁻ with positive extraction for He⁺ that is followed by charge exchange to He⁻ in a Na-based electron donor canal. The switch-over between H and He operation is fully automated and computer controlled, including the change-over of the required power supplies, and does not require any mechanical changes on the source head. The source produces in excess of 300 eUA of H⁻ and more than 25 eUA of He⁻. It is expected the design allows for substantially higher currents, especially for H⁻.

Funding Agency

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Yes

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