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Recent Research and Development of RF-Driven H- Sources at CSNS

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The RF-driven ion source has been put into commissioning on China spallation neutron source (CSNS) accelerator since September of 2021. It has a service life time of more than 310 days and availability of almost 100%. To fully meet the requirements of CSNS project phase-II (CSNS-II), the beam intensity should be enhanced and the transverse emittance should be minimized. This report covers the recent research and development of the RF-driven H^- source, including the impurities elimination from the hydrogen plasma, the transverse emittance optimization, and space charge compensation study. A new test bench consisting of an ion source and an LEBT is constructed to carry out these measurements and research. A featured function of the LEBT is the electrostatic beam chopping. The influence of chopping electric field to the space charge compensation is also experimentally studied.

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