

## **HVPS Integration and Ion Beam Extraction in ROBIN**

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An important milestone in the operation of ROBIN, the single driver RF based (100 kW, 1 MHz) pulsed negative hydrogen ion source test bed facility, is the integrated operation with the two power supplies, for extraction and acceleration. ROBIN has been established in collaboration with IPP, Germany [1] and is the first step towards the development and operation of large area and long pulse negative ion sources such as DNB in ITER and indigenous fusion programs in future. The mandate for ROBIN is therefore to replicate the operational space of BATMAN [2], and extend the experiments for a better understanding of the plasma physics of operation of cesiated ion sources. Operation of ROBIN over the past few years have replicated the operational space of BATMAN, in volume mode in the negative ion extraction mode. The surface operation mode is now enabled with the integrated operation of ROBIN with the two High Voltage Power Supplies (HVPS) – Extraction Power Supply System (EPSS) & Acceleration Power Supply System (APSS)[3]. More than 30 kV of operation has been demonstrated in the volume mode in ROBIN integrated with HVPS, where current densities of  $\sim 15 \text{ mA/cm}^2$  has been extracted at RF power of 50 kW. This operation has proved the successful integration of the HVPS and the Data Acquisition and Control System (DACS) with ROBIN, with fully remote mode operation [4]. The next step will be the operation of ROBIN with Cesium and extraction and acceleration of  $\sim 3 \text{ A}$  of negative Hydrogen ion Beam in the 30 – 35 kV range. The beam intercept will be replaced by a thermal calorimeter in surface mode operations. Several other diagnostics like Langmuir probes, spectrometer, laser photo detachment etc. have been installed with the facility. The paper will present the operational experience of integration of HVPS with ROBIN in volume mode and the operational results from Surface mode, as a testimony of realization of ultimate objective of ROBIN.

[1] G. Bansal, A. Gahlaut, J. Soni, et al., "Negative Ion Beam Extraction in ROBIN", Fusion Eng. Design, 88 (6-8), pp. 778-782, (2013).

[2] E. Speth, H.D. Falter, P. Franzen, et al., "Overview of the RF source development programme at IPP Garching", Nuclear Fusion, 46 (6), pp. S220-S238, (2006).

[3] A. Gahlaut, J. Sonara, K.G. Parmar, et al., "Power supply system for negative ion source at IPR", Journal of Physics: Conf. Series, 208, 012060, (2010).

[4] J. Soni, R. Yadav, A. Gahlaut, et al., "Conceptual design, implementation and commissioning of data acquisition and control system for negative ion source at IPR", AIP conf. Proc., 1390, pp. 624-633, (2011).