Contribution ID: **137** Type: **Contributed Oral**

The gasdynamic ECR ion source developed at IMP and its preliminary results

Monday, 8 September 2025 10:20 (20 minutes)

Driven by the increasing demands on high-intensity heavy ion beams, next-generation acceleration facilities require unprecedented beam intensities from the front-ends, such as High Intensity Heavy-io Accelerator Facility (HIAF) constructed in China. The future upgrade of HIAF requires its injector to deliver over 50 pμA U beams with a charge state beyond 40, which is far beyond the capability of state-of-the-art ECR ion sources, the present pre-injectors of the HIAF. As an alternative solution, it was proposed to pre-accelerate tens of emA ion beams with low-to-medium charge states produced by a gasdynamic ECR ion source, and then to strip them to the higher charge states. As the first step to investigate this scheme, a 45 GHz gasdynamic ion source which operates in pulsed mode has been developed. Electron temperature diagnostic has been performed by measuring the energy distribution of the lost electrons and fitting it with the integral of the Maxwell electron energy distribution function. First beams have been extracted to demonstrate its potential of intensive beam formation.

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Session Classification: Oral Session

Track Classification: Production of high intensity ion beams