



Contribution ID: 2265 Contribution code: TUPM086

Type: **Poster Presentation**

SEISM: 60 GHz ECR ion source for future accelerator

Tuesday, 9 May 2023 16:30 (2 hours)

ECR ion sources produce ion beams with an intensity proportional to the heating frequency. SEISM (Sixty gigahertz Ion Source using Megawatt magnets) is a unique source operating at the record frequency of 60 GHz thanks to a gyrotron producing high intensity HF pulse (up to 300 kW). The prototype is based on a simple magnetic geometry, the cusp, using polyhelix coils (developed with the LNCMI, Grenoble) to generate a closed ECR surface at 2.1 T.

Since 2019, several experimental campaigns were carried out with helium and argon beams and production of ion current densities of 1 A/cm² were achieved. The transport of high intensity beam is studied thanks to the dedicated transmission line and qualified with emittance measurements using a pepperpot device. Using several support gases, plasma studies are also carried out as function of source parameters such as extraction high voltage, gas pressure, bias disc potential. The dynamic of the afterglow pics is also investigated.

Recent experimental results, short- and long-term research plans as well as technological choices (metal 3D printing) will be presented to transform this high current density into a high intensity ion beam that can be used for the accelerators of the future.

Funding Agency

Footnotes

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Yes

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Session Classification: Tuesday Poster Session

Track Classification: MC4: Hadron Accelerators: MC4.T01: Proton and Ion Sources