

**Recent results of the 2.45 GHz ECR
source producing H⁻ ions
at CEA/Saclay**

Poster n° MOP74

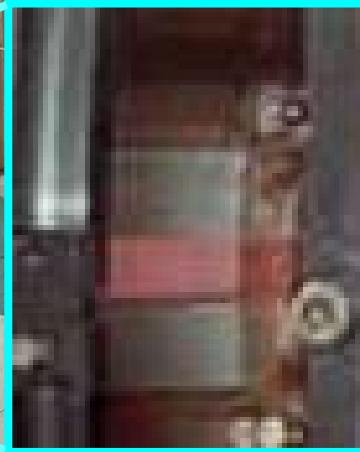
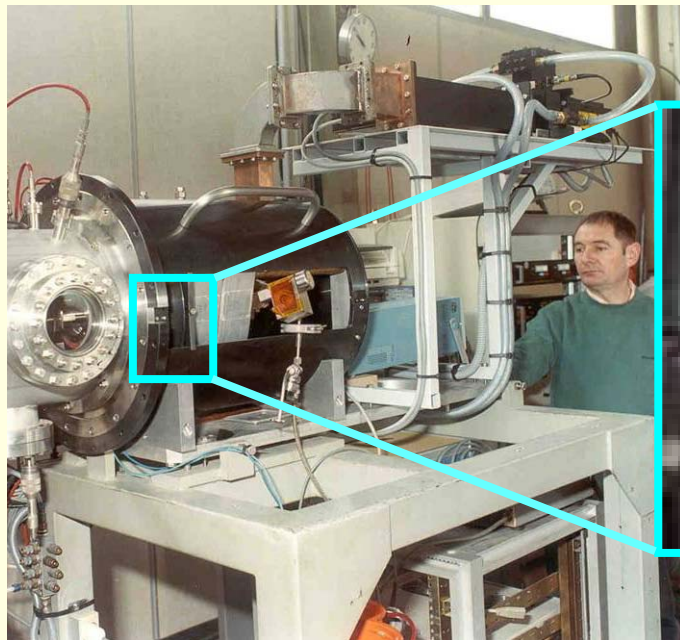
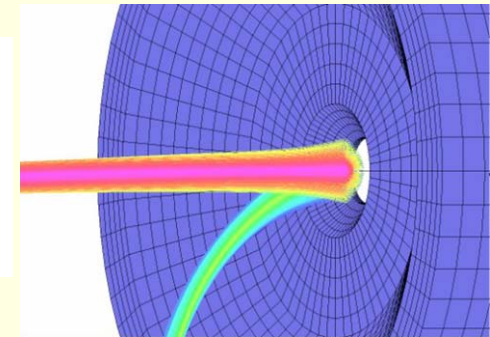
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**R. Gobin, K. Benmeziane, O. Delferrière, R. Ferdinand, F. Harrault
Commissariat à l'Energie Atomique DSM / DAPNIA / SACM
A. Girard,
Commissariat à l'Energie Atomique DSM / DRFMC / SBT**

2.45 GHz source design

*Aim : for high power accelerators,
H- current as high as few tens of mA at 50 to 100 kV*

At Saclay,
construction of a new source based on ECR plasma creation
Preliminary calculations with Axcel and Opera 2D codes

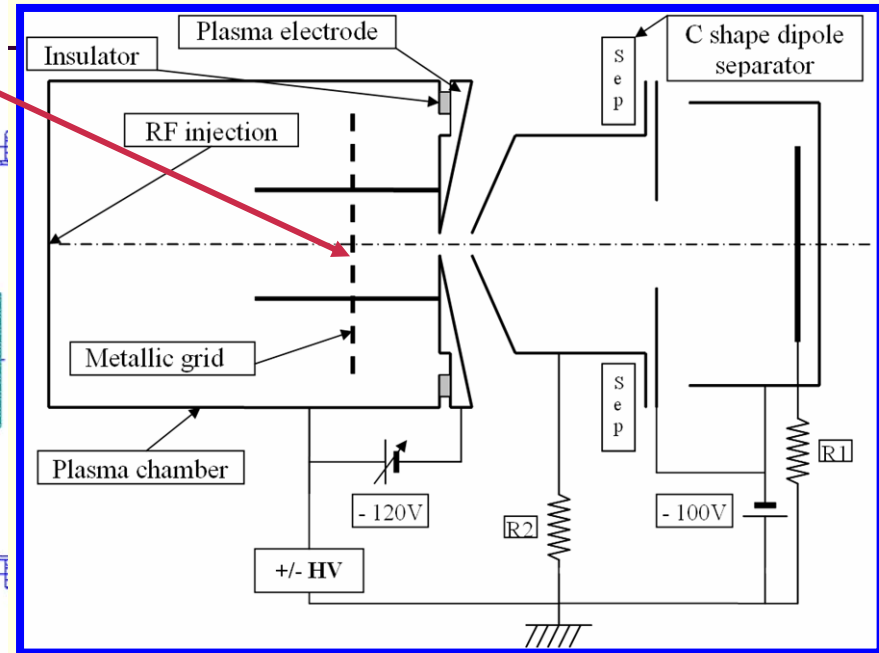
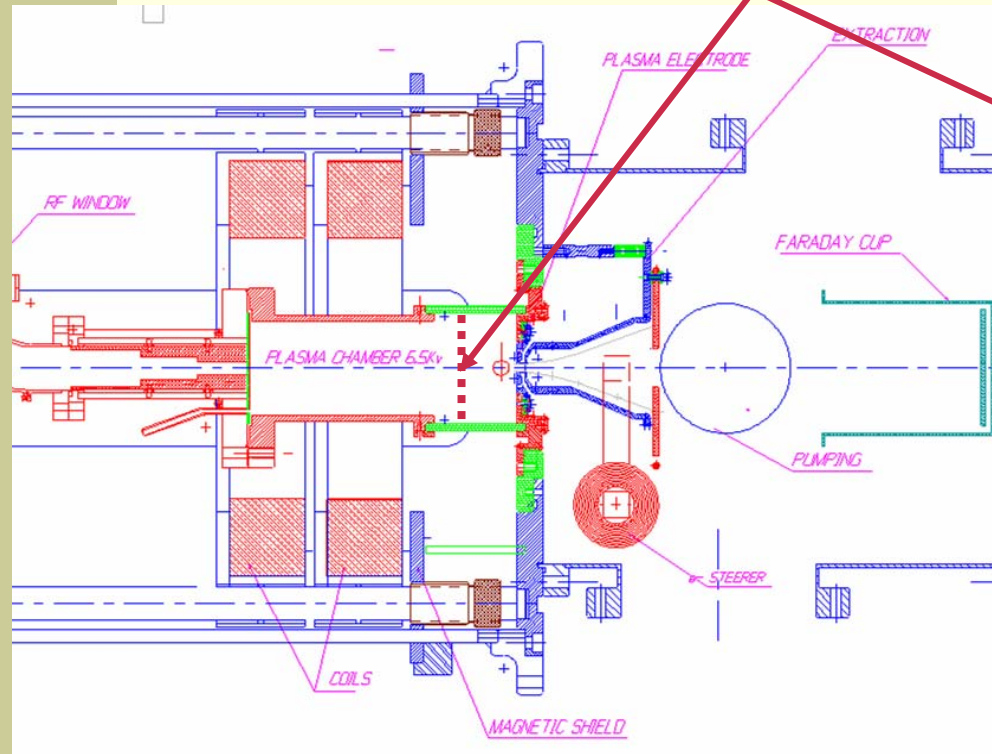


Technical options

Rectangular plasma chamber
5 mm extraction aperture
Source working at 2.45 GHz
Protected window
ECR zone at RF entrance
Operation : Pulsed mode
Energy 10 kV

2 chambers

Installation of a stainless steel grid in the rectangular plasma chamber



Optimisation:

Grid position

I_{H^-} nearly $100 \mu A$

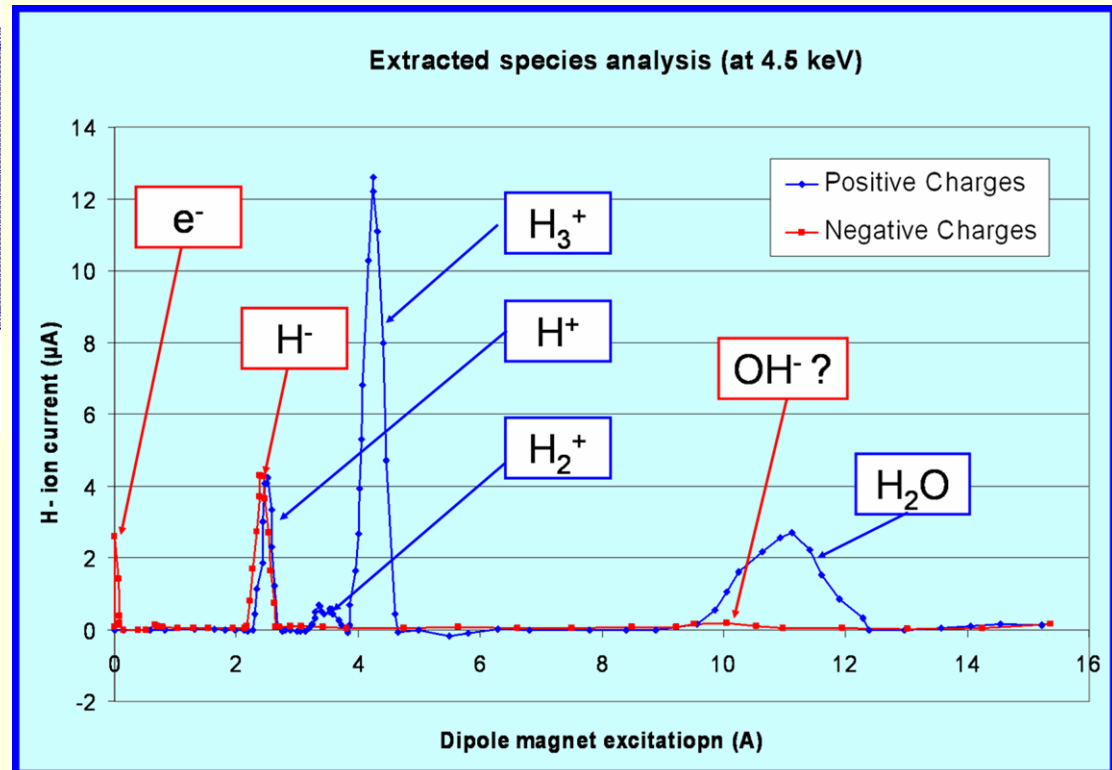
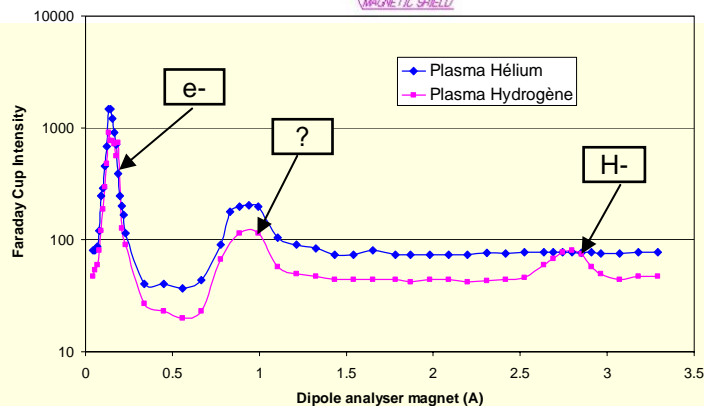
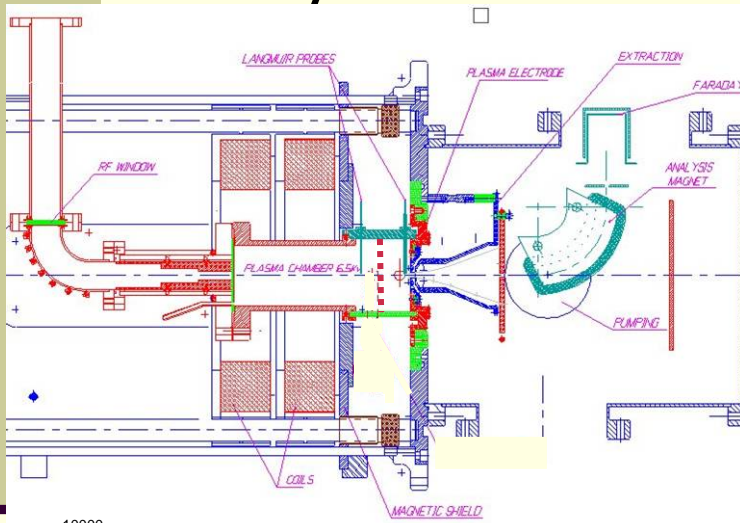
Grid polarization

I_{H^-} nearly $1mA$

H⁻ gain confirmation

To prove effective H⁻ ions production

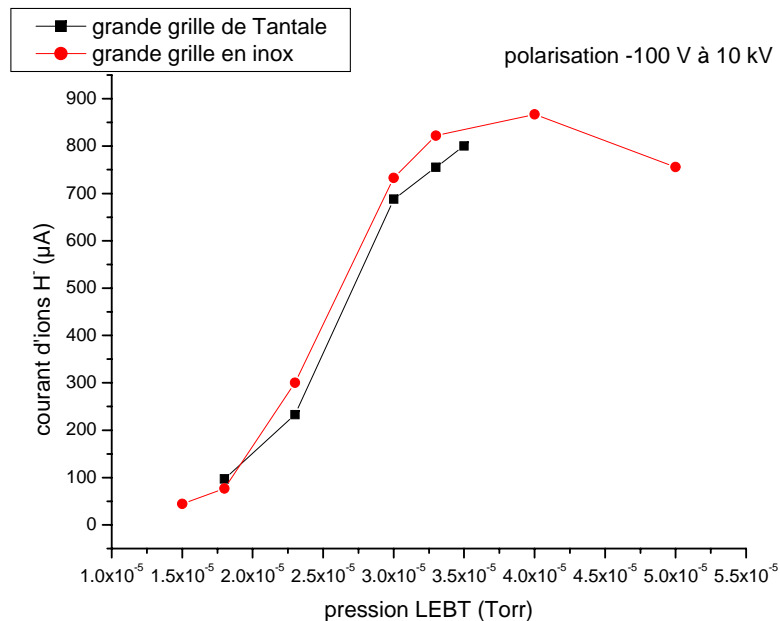
No Faraday cup current while operating with Helium plasma and analysis with the dipole magnet confirmed the H⁻ ions



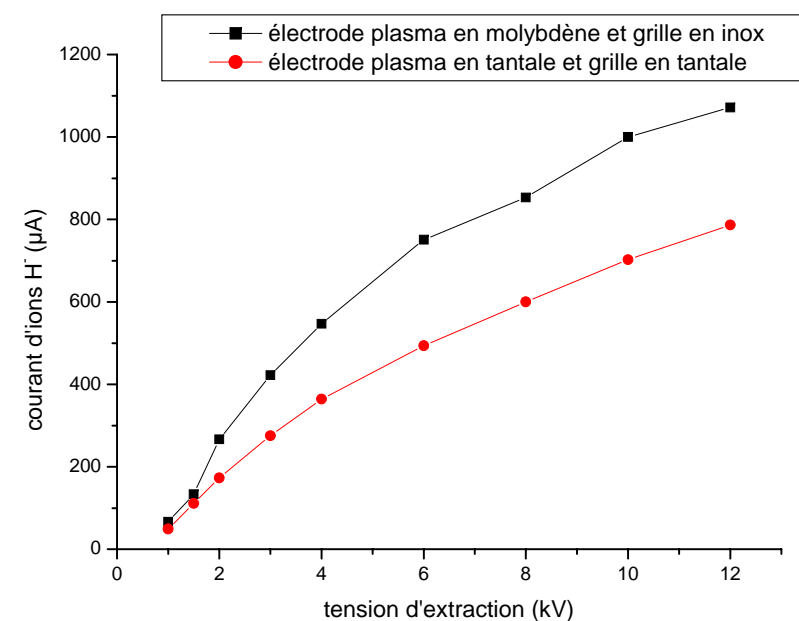
Tantalum material

First comments :
no improvements with grid or plasma electrode made with Tantalum

Extracted H- beam vs H₂ pressure



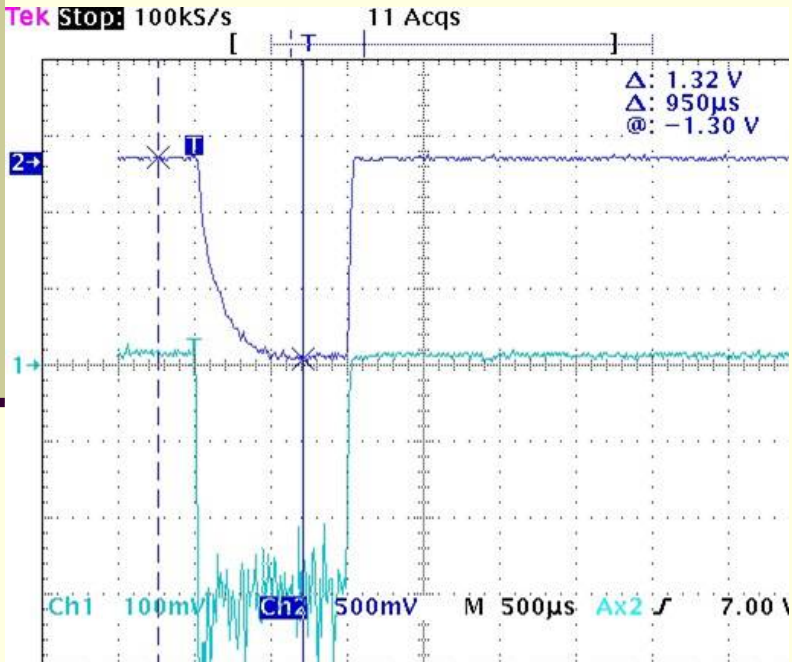
Extracted H- beam vs extraction voltage



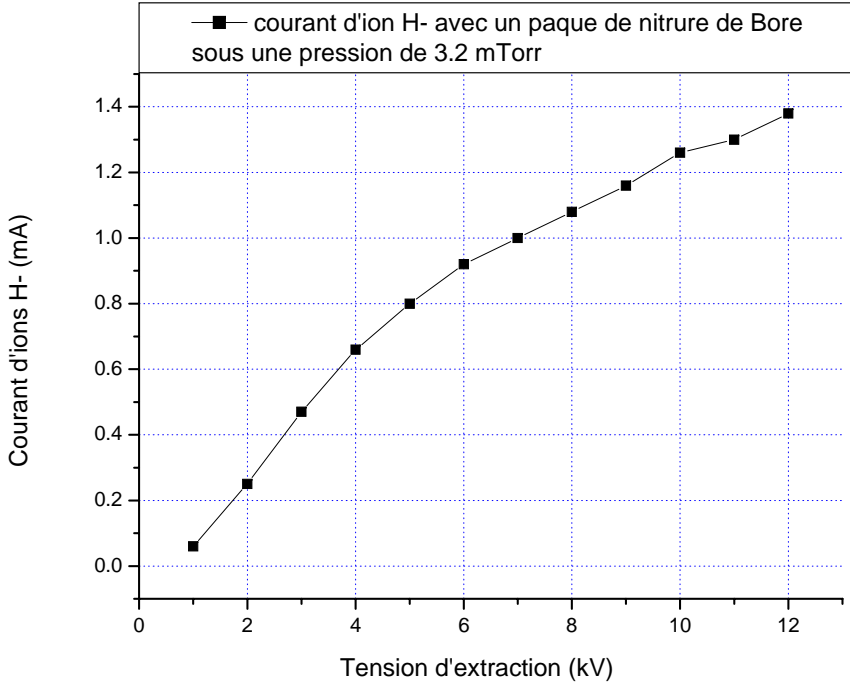
Boron Nitride

To increase the electron density in the plasma generator zone, Boron Nitride plates have been installed on the copper walls ...

The extracted H- beam increased up to 1.32 mA at 10kV.



and shorter rise time 500 μs



Future plans

2.45 GHz Test stand :

- Installation of 6 kW magnetron
- Design of a new extraction system
- Design of a circular plasma chamber
- Cesium injection ?

Moreover, the design of a new source based on a 10 GHz ECR plasma generator has been completed at CEA/Grenoble. The multi cusp magnetic configuration will be provided by permanent magnet octopole. This program will be transferred to Saclay.

