

WORKSHOP TARGETS – ION SOURCES

GANIL, CAEN, 6-9 SEP. 2023

ION SOURCE SESSION

-INTRODUCTION-

Main Stable Ion Source Teams in France

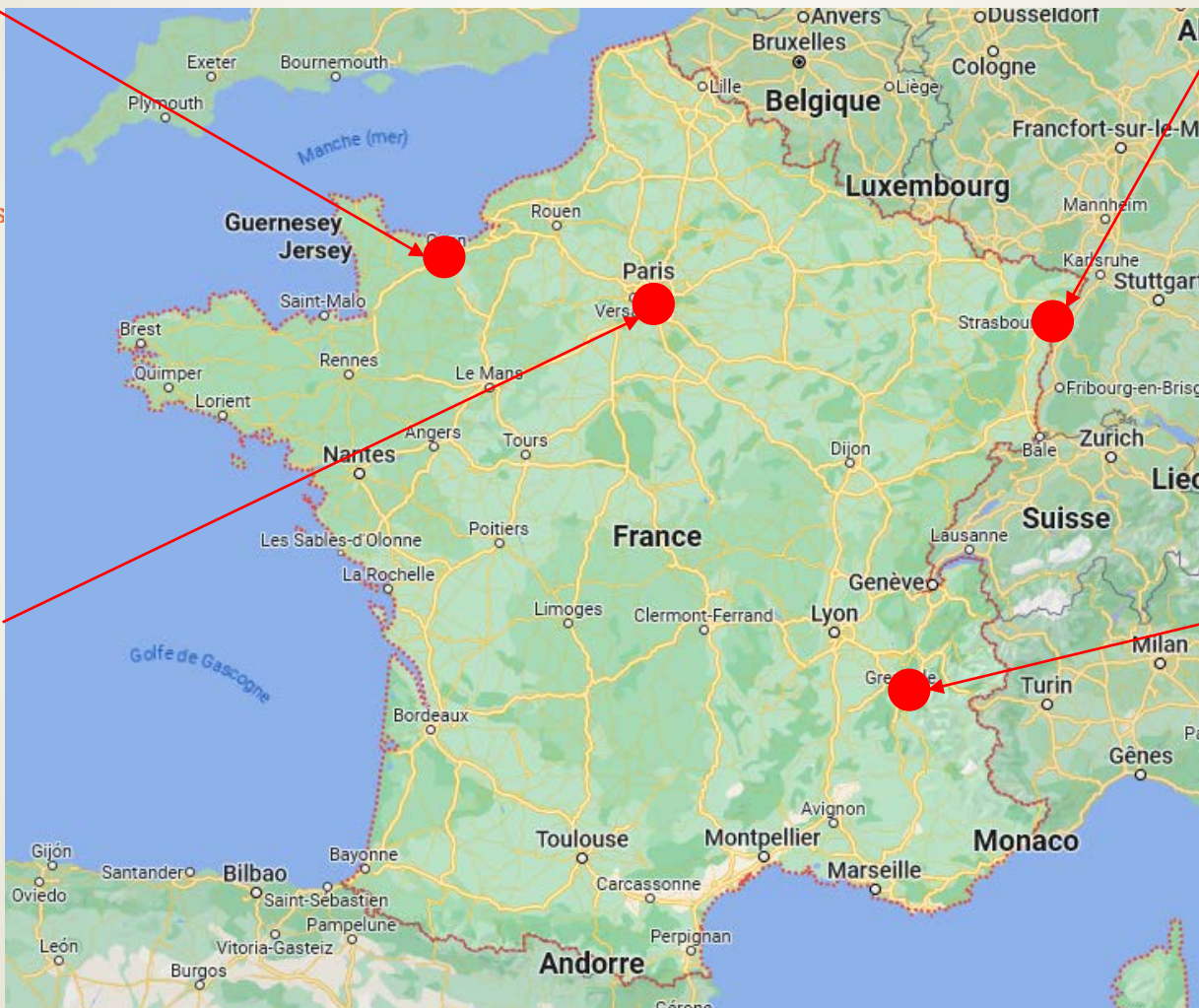


Caen



Main French ion accelerator facility
Many ion sources in operation

H.R.: 3.5-4 permanents
7 ECRIS



Strasbourg



R&D on Metallic compound synthesis
MIVOC, metallic Ovens

H.R.: 3 permanents
Chemistry Lab.

Saclay



Proton sources
high intensity
, simulations



H.R.: 4 permanents
2 ECRIS

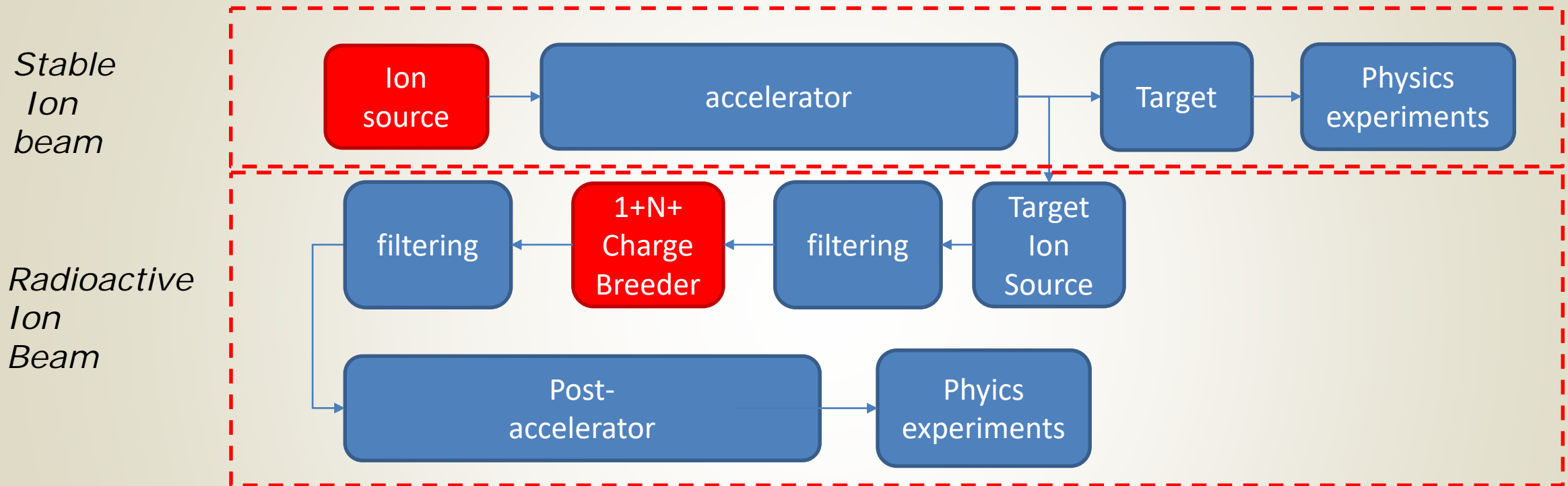
Grenoble



R&D on multicharged
ECRIS, charge
breeder, simulations

H.R.: 5 permanents
3 ECRIS

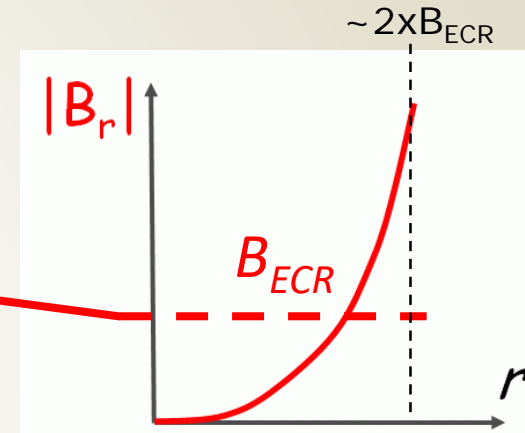
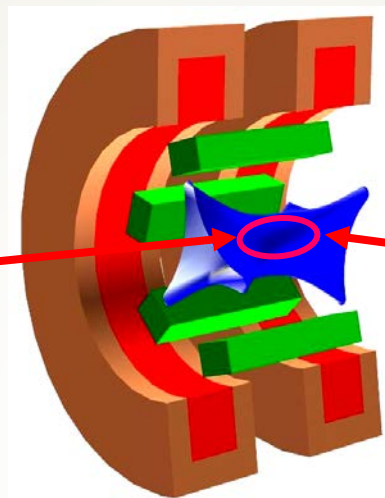
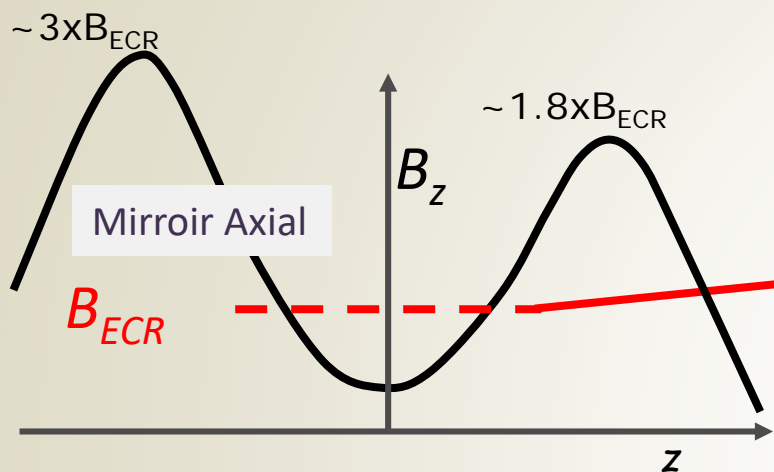
Ion Sources and Beam Requirements



▪ Requirements and critical parameters for the ion sources

- particle type, particle flux on target, production efficiency, beam purity
- Duration of run, beam stability, beam availability, etc

ECR Ion Source for stable beam production

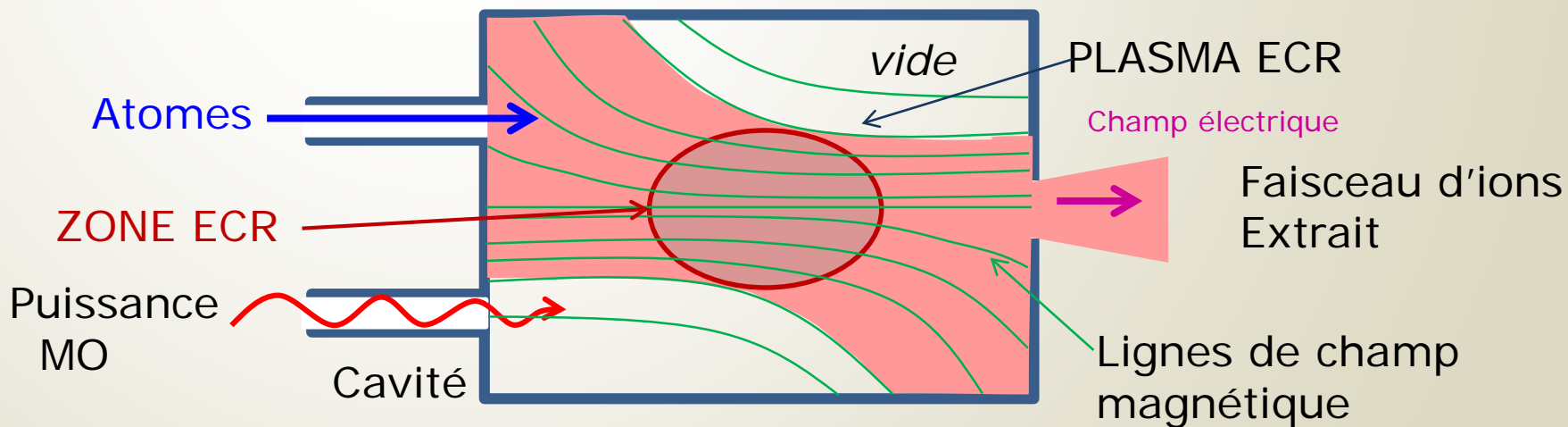


Champ hexapolaire

$$2\pi f_{HF} = \frac{eB}{m_e}$$

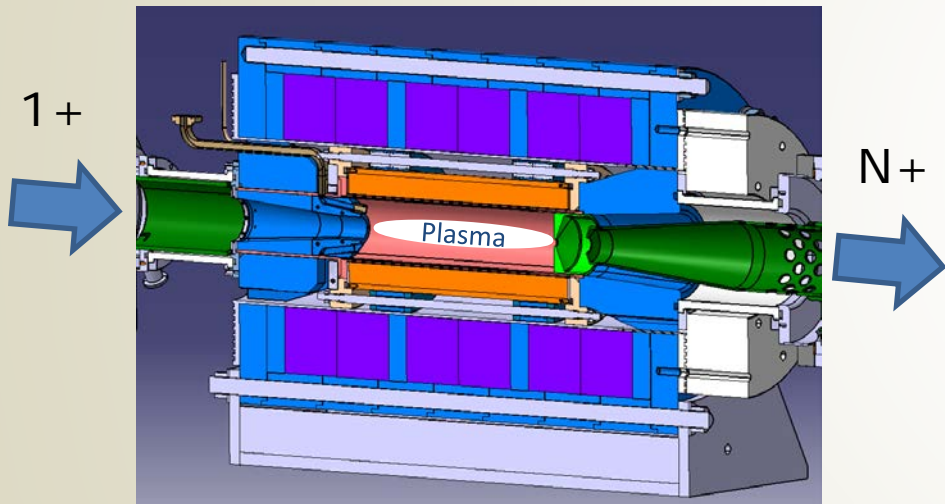
$$I \sim f_{HF}^2 \sim B^2$$

- Efficient
- Robust
- Reliable
- No known current limitation



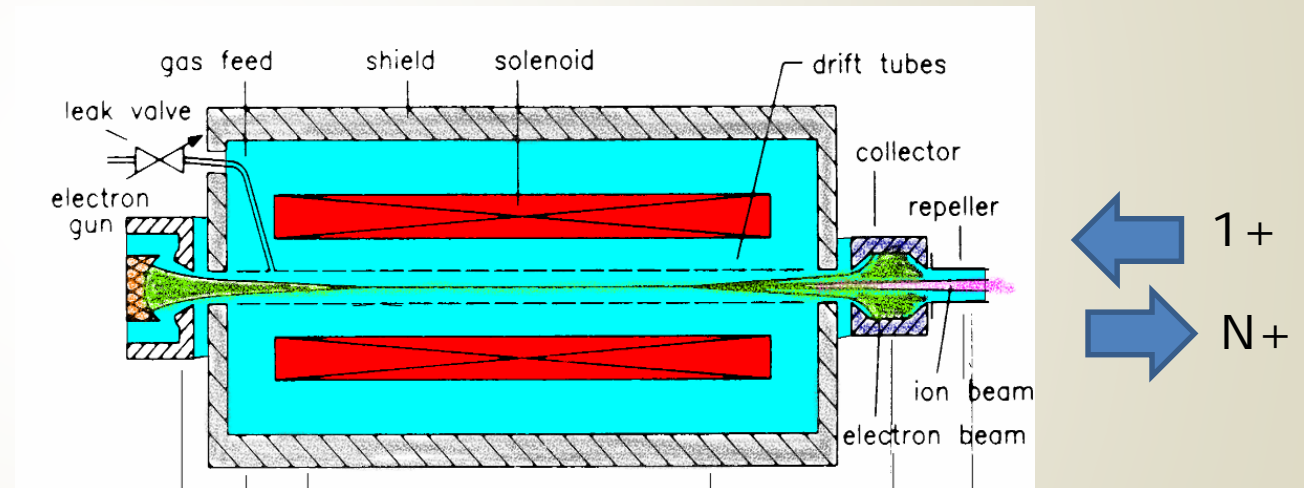
1 + N+ Charge breeder to boost the RIBs charge state

ECRIS



R. Vondrasek Talk (ANL)
LPSC Talk

EBIS



R. Vondrasek Talk (ANL)

Ion Beam Challenges for the coming years in France

- **Improve beam intensities and reliability**
 - For the existing GANIL, SPIRAL1 and SPIRAL2
- **Develop high intensity metallic ion beams**
 - 10 pμA up to the uranium for the SPIRAL2 accelerator (NEWGAIN project)
- **Enhance the beam availability and stability**
 - Currently addressed by the ERIBS collaboration with a tiny EU budget (EURO-LAB)
 - Is it sufficient?
- **Keep the expertise and the know-how of the teams on a long term**
 - Tiny teams with a risk of expertise loss
 - Is there sufficient time for R&D?
 - How to attract young talented technicians, engineers and PhDs?
- **Keep the teams motivated**
 - Are the HR adapted to the accelerator demands?
 - Are the conditions of work appropriate?

Overview of the Ion Source Session

- **Return of experience of Operation of Stable Ion Sources in large accelerator facilities**
 - GANIL: F. Lemagnen
 - GSI: F. Maimone
 - MSU/FRIB: G. Machicoane
- **Return of experience of the Radioactive Ion beam charge breeders at Argonne**
 - What future for EBIS AND ECRIS CB?
- **Preparing the beams of tomorrow**
 - Experience with Superconducting ion sources (G. Machicoane, MSU)
 - Designing ECRIS magnet (D.Simon, CEA-IRFU)
 - Metal vaporization for ECRIS (B. Gall, CNRS-IPHC)
- **Ongoing R&D in France**
 - Plasma and Beam extraction simulation (O. Tuske, CEA-IRFU)
 - Upstream research and plasma investigations at LPSC (T. Thuillier, CNRS-LPSC)

LET'S GET STARTED!

13. Operation with ECR ion sources at GANIL

frederic LEMAGNEN

07/09/2023 14:15

20+5

Ion Source and Stable B...

10. GSI ECR ions sources and metallic beams

Dr Fabio Maimone (GSI)

07/09/2023 14:40

20+5

Ion Source and Stable B...

12. Vapor production for metallic beam & Isotopes

Benoît GALL (IPHC Strasbourg)

07/09/2023 15:05

20+5

Ion Source and Stable B...

33. Ions Sources développements at LPSC

Thomas Thuillier (LPSC)

07/09/2023 15:30

20+5

Ion Source and Stable B...

Coffee Break 16:05-16:15

30. Superconducting Magnet

M. Damien Simon (CEA/IRFU)

07/09/2023 16:15

20+5

Ion Source and Stable B...

11. Superconducting Ions Sources

Dr Guillaume Machicoane (FRIB)

07/09/2023 16:40

20+5

Ion Source and Stable B...

14. Charge Breeder : EBIS-ECRIS

M. Richard Vondrasek (ANL)

07/09/2023 17:05

20+5

Ion Source and Stable B...

28. Plasma and extraction simulation

Dr Olivier Tuske (CEA/IRFU)

07/09/2023 17:30

20+5

Ion Source and Stable B...

6. Round Table

45

07/09/2023 17:55

Ion source and stable be...

Ion Source and Stable B...