Status of the SEISM Experiment

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Outline

1. Context
2. SEISM magnetic structure
3. SEISM beam test bench
4. First experiment, preparing 60GHz operation

Initially: a pulsed ion source prototype for beta-beams

RADIATION RESISTANT

EFFICIENT IONIZATION

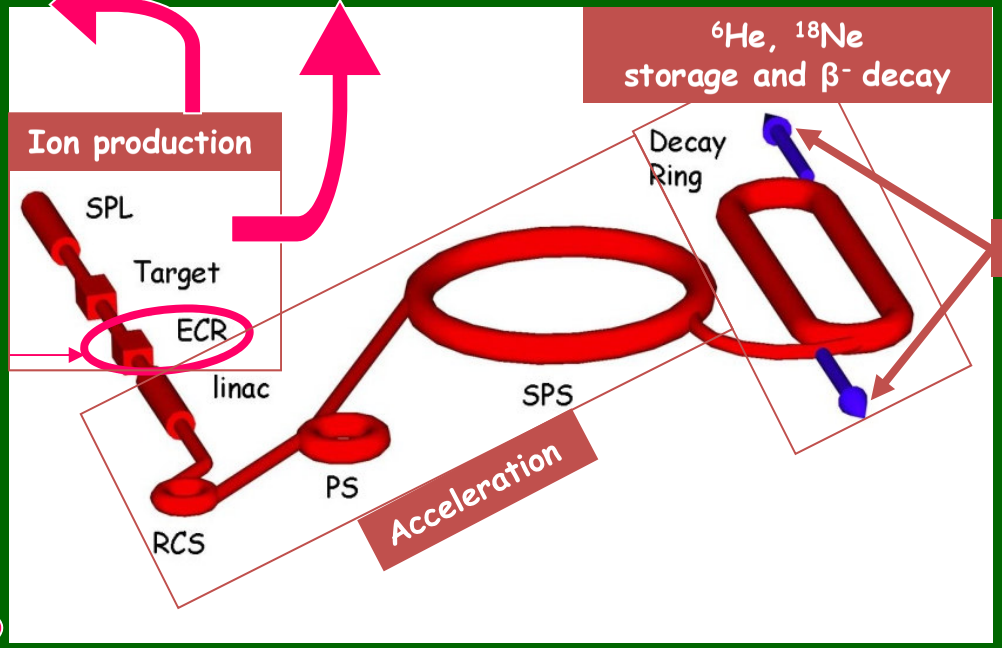
Target production

10^{13} at/s

half-lives

807ms (^{6}He); 1.67s (^{18}Ne)

PULSED MODE
SHORT BUNCHES



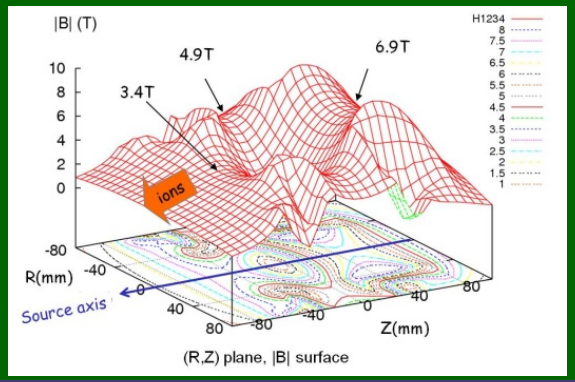
10Hz to 25Hz rep. rate
50-100μs pulses

The beginning of a unique high frequency ECR experimental programme

Development steps

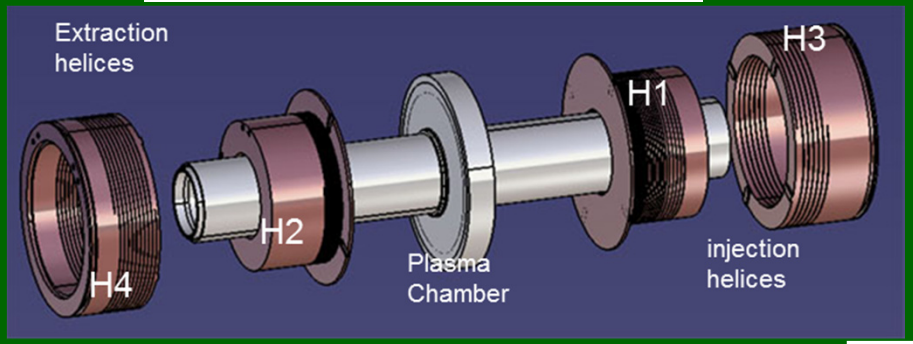
End 2007 - 2008

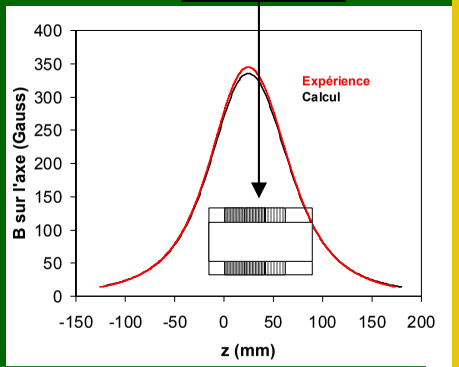
Magnetic calculations



H1 aluminum prototype

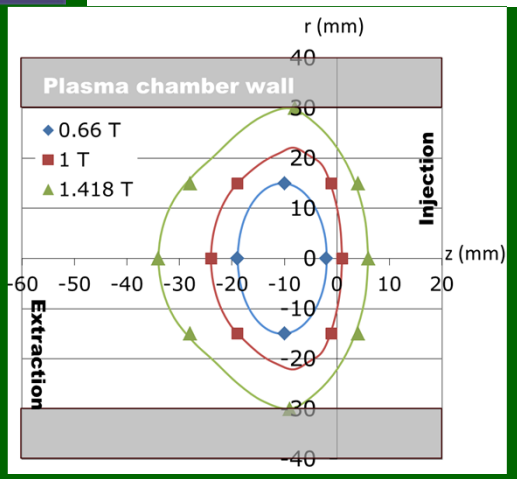
CAD design





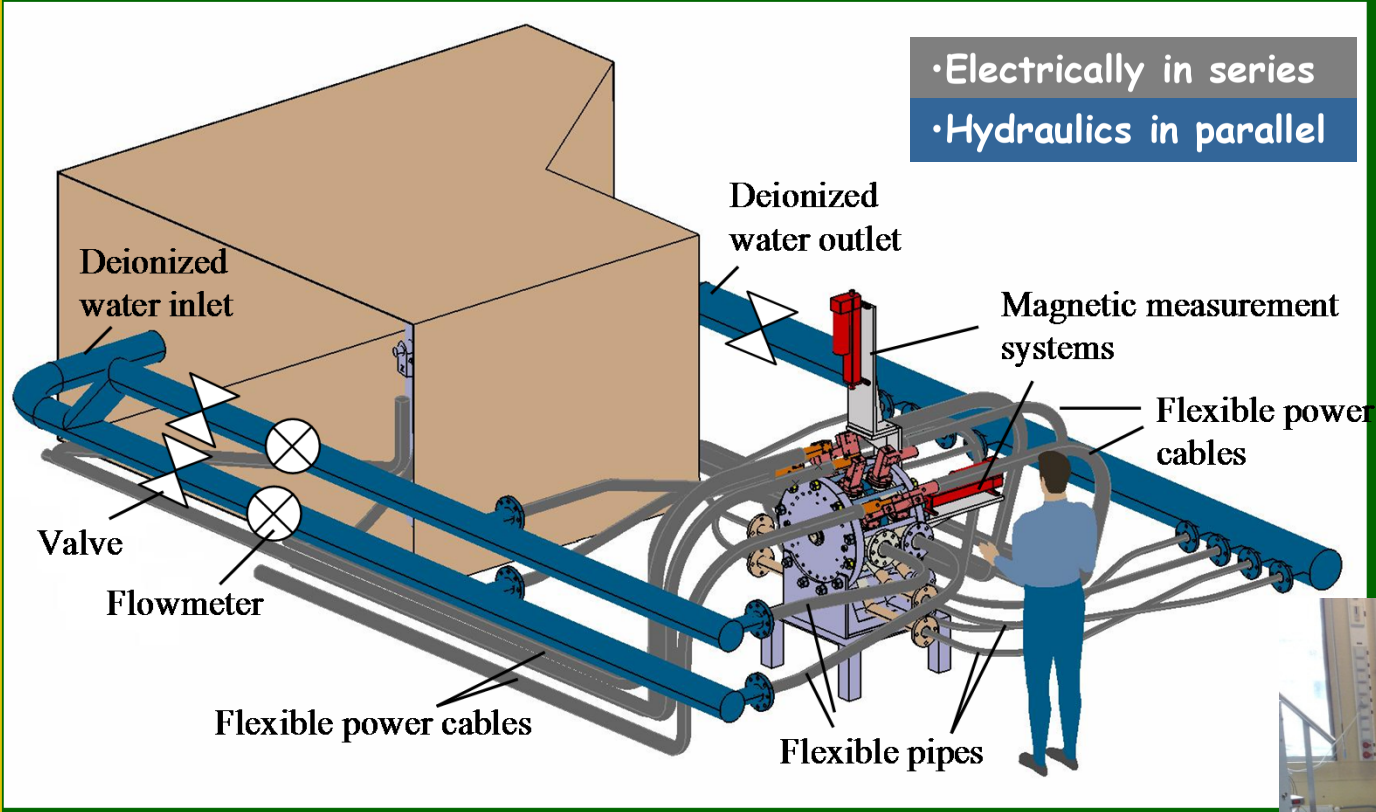
2009 Source prototype and magnetic test bench construction

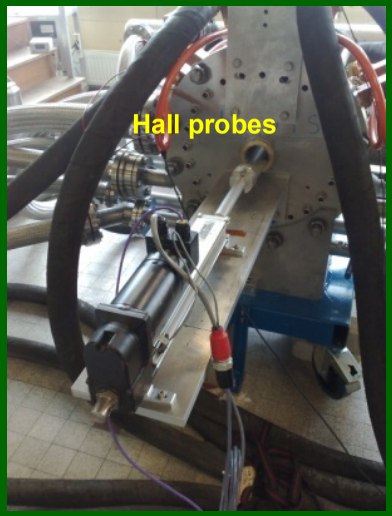
2010 Validation of a closed 1T surface for 28GHz ECR



First magnetic measurements on M5 site

On-site connection to a running magnet for half-magnetic field test

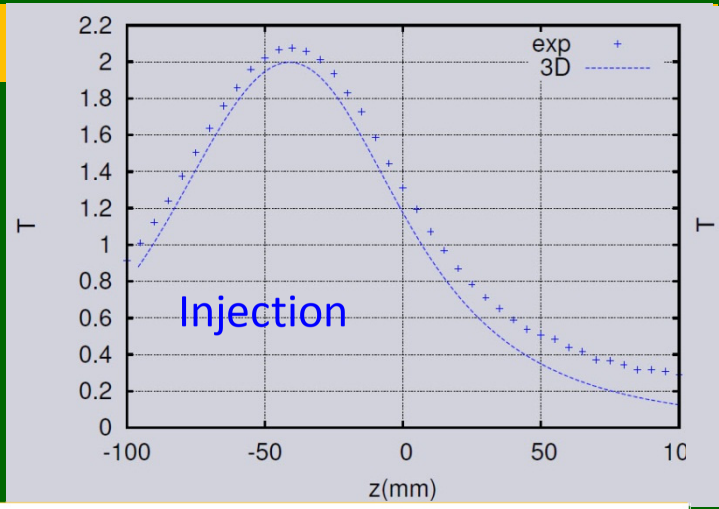


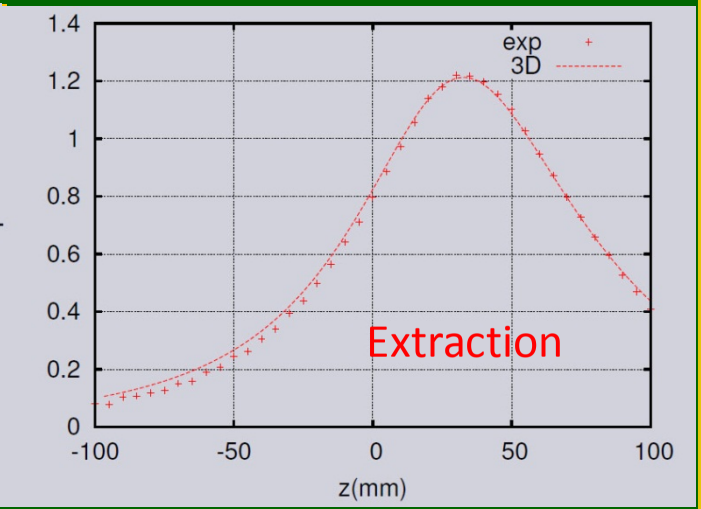


Validation of the operation with a direct connection

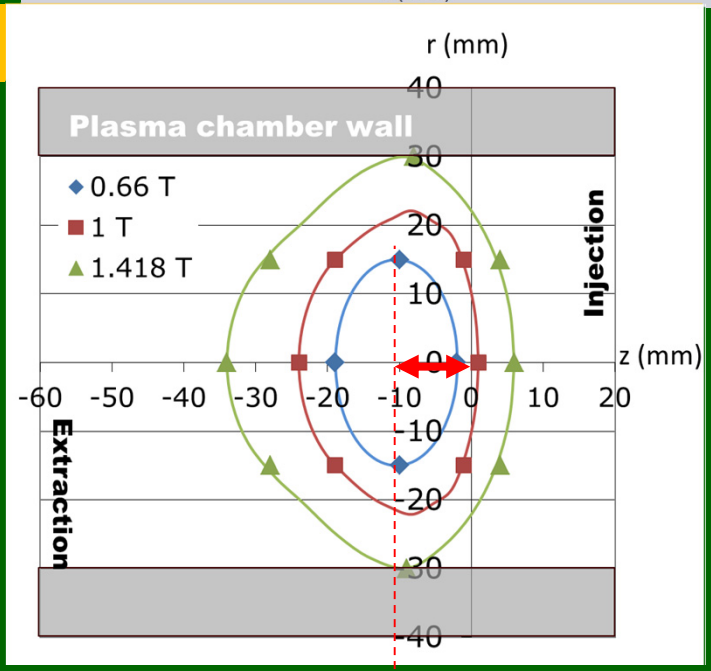
Simulations and experimental data

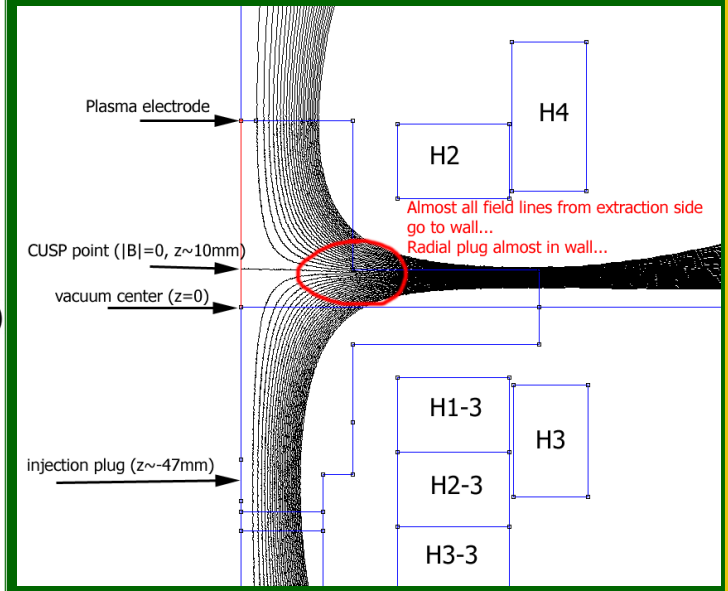
1°) Amplitude mismatch





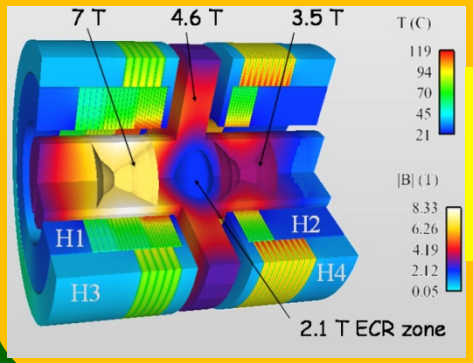
2°) B=0 shift





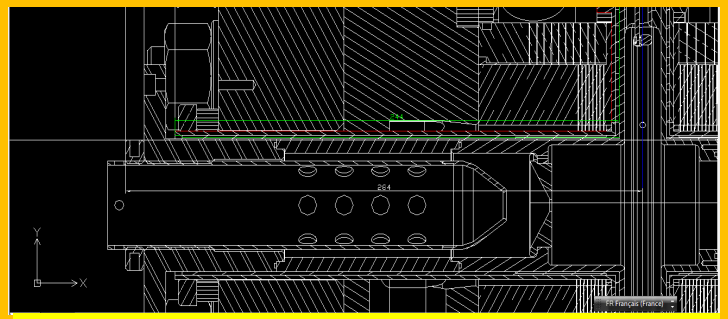
B = 0 shift Investigation

1°) Checking the model



No explanation found

2°) Mechanical verifications

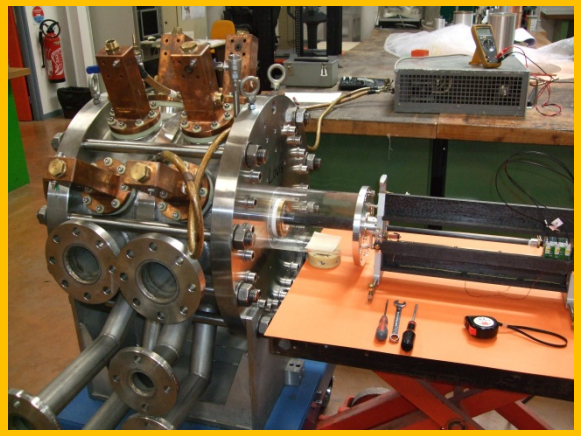


No explanation found

3°) New magnetic measurements

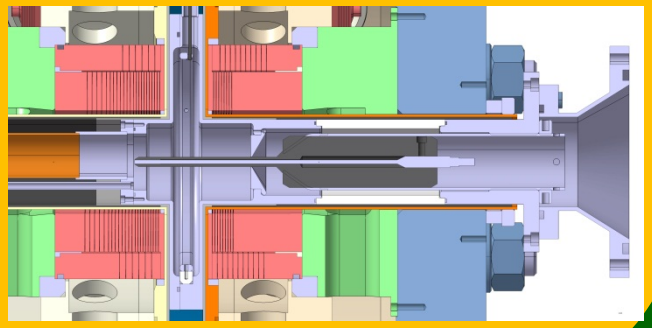
Flux integration

Result: 6mm



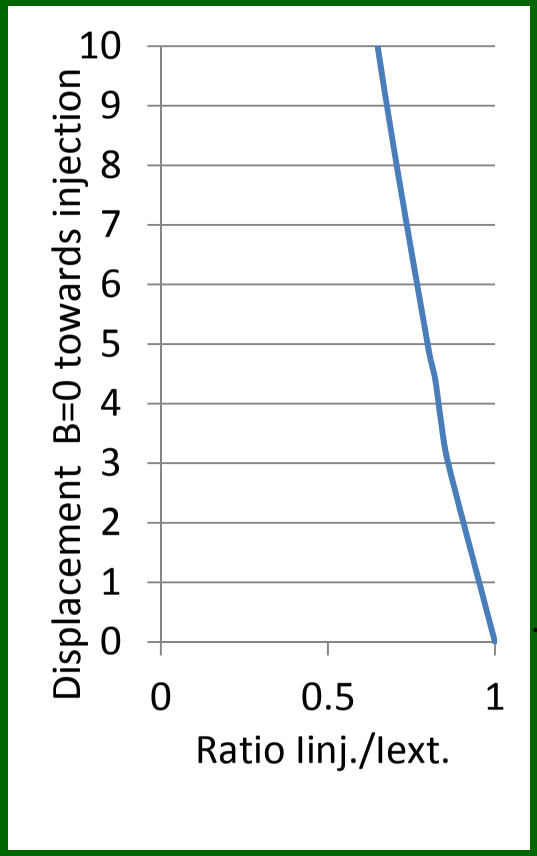
Last direct measurement

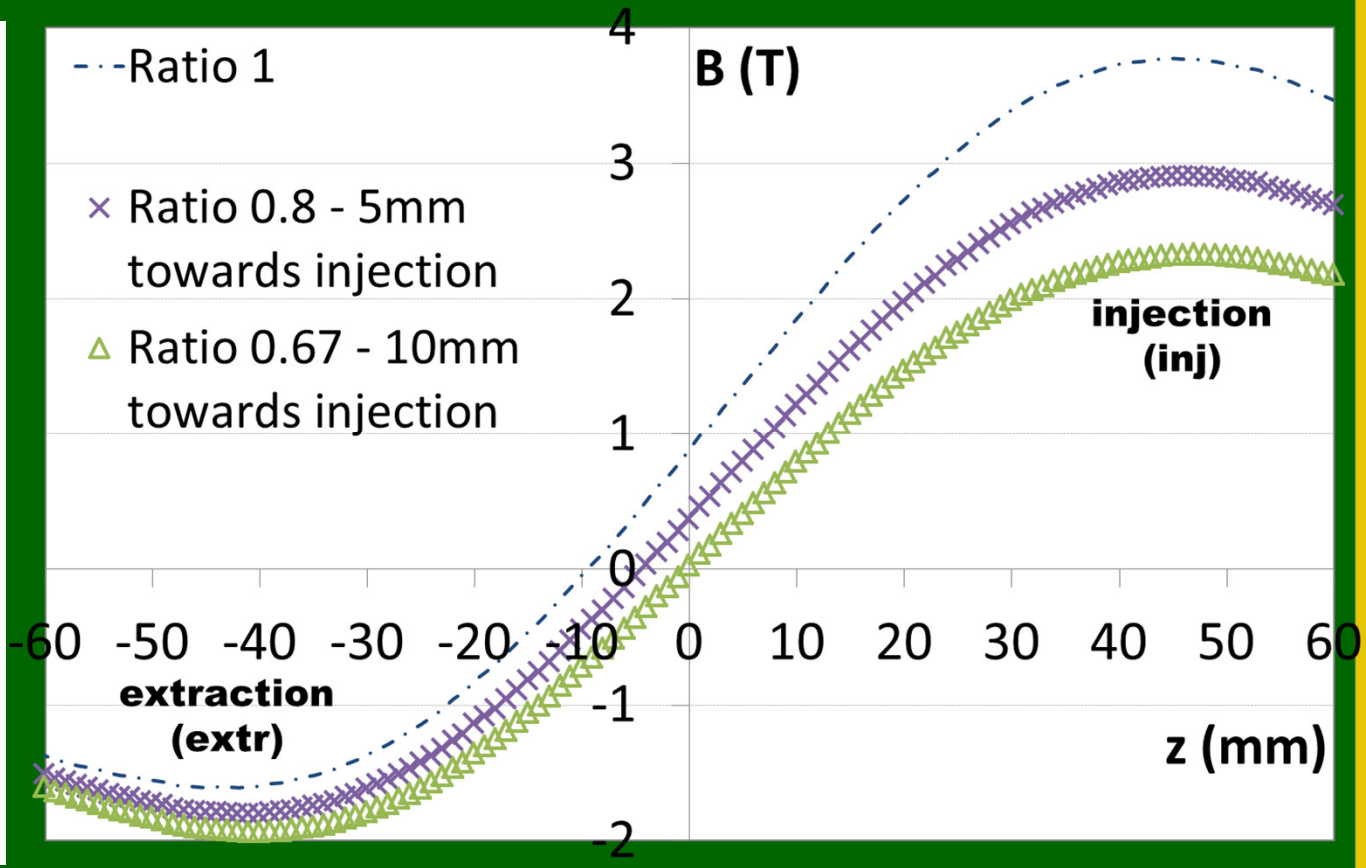
Result: 5mm



Present solution

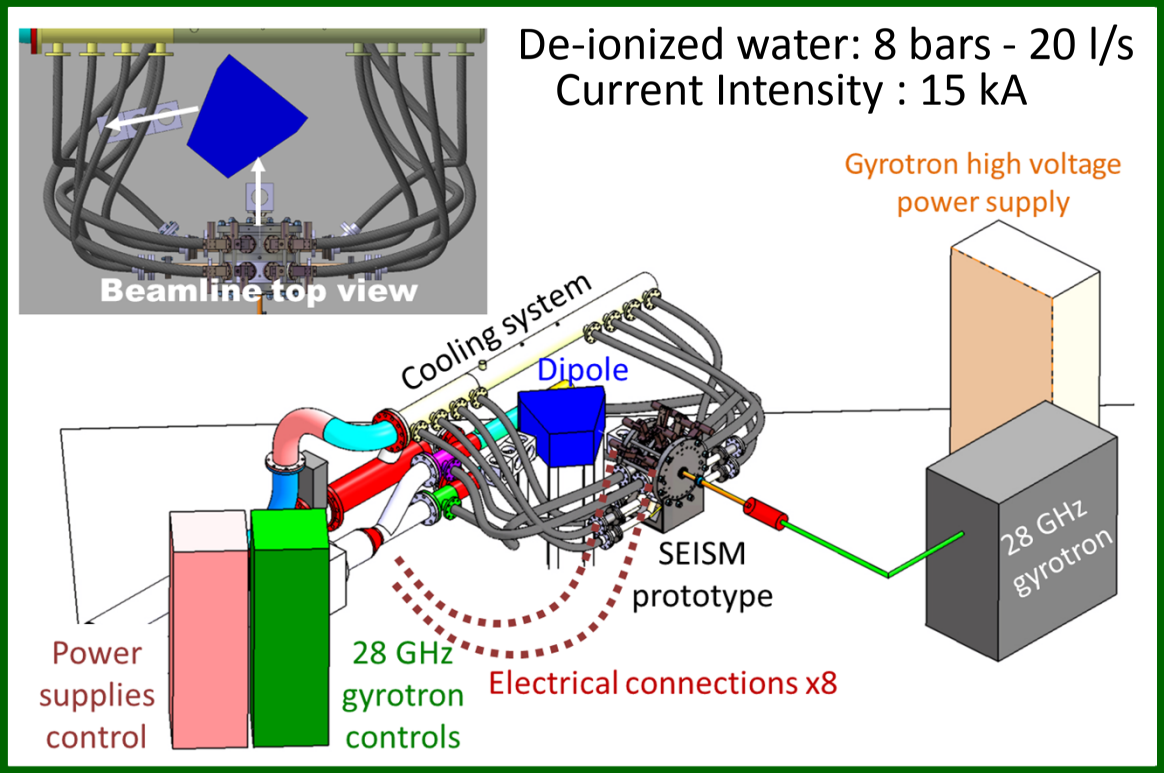
Change current intensity ratio between injection and extraction coils = Iinj/Iext



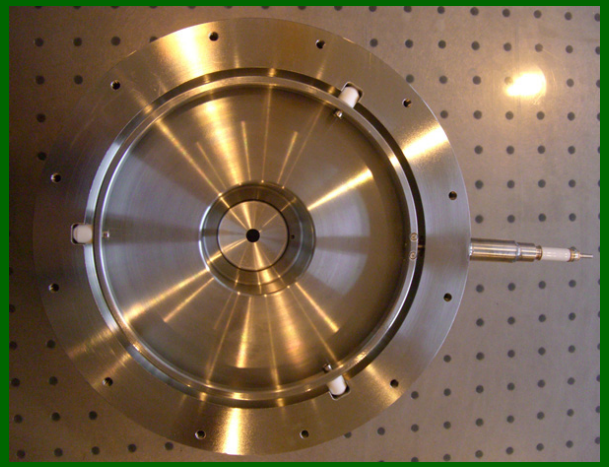


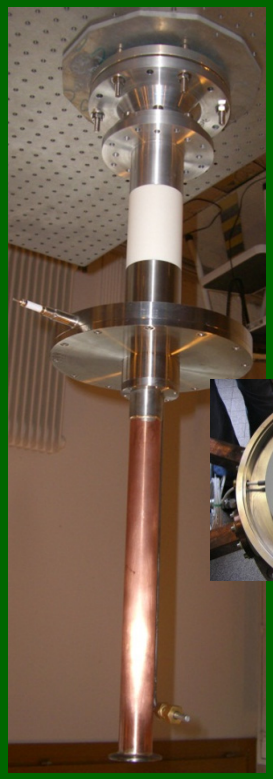
Installation on the M3 site at LNCMI

- Risk analysis (HV, RF, X-rays)
- Civil engineering study
- Mechanical adaptation for direct hydraulic and electrical connections



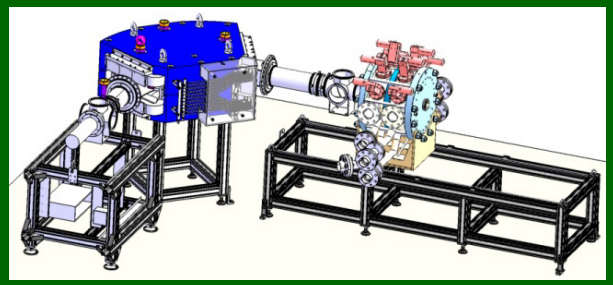
Source assembly

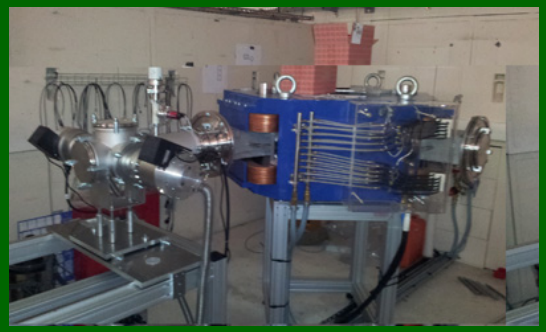




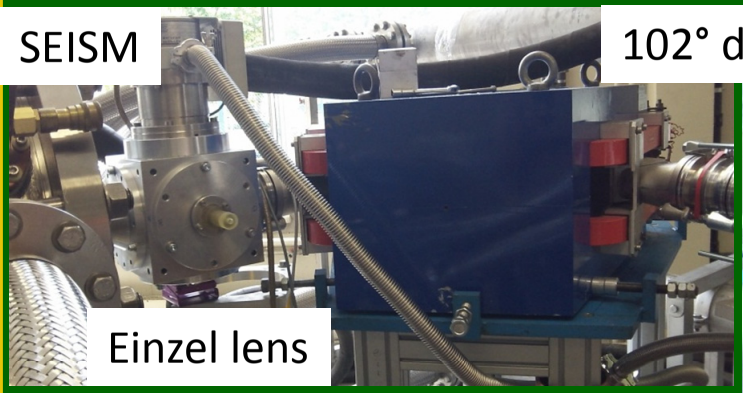
Beam line construction

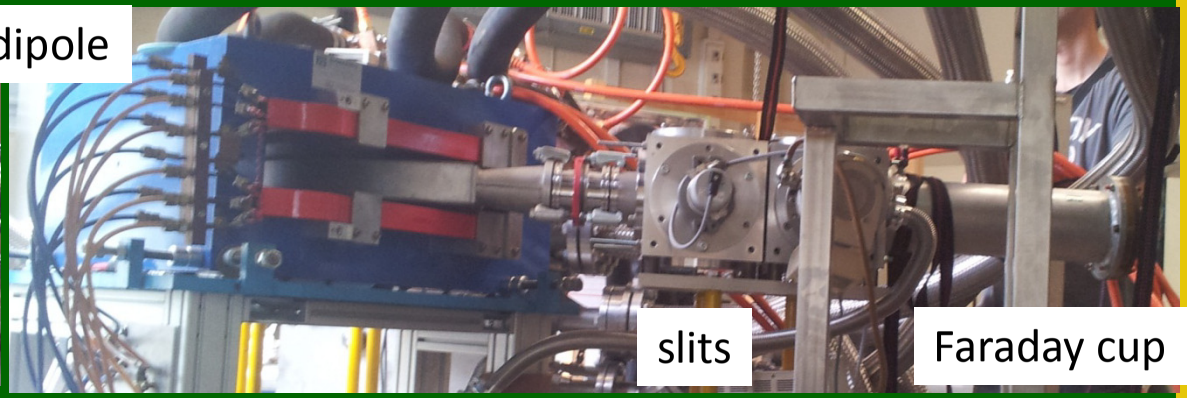
- The SEISM prototype may deliver very high intensities
  - So High intensity beam line necessary (Spectrometer 150 mm gap, 2 tons)
  - Not to be installed at LNCMI (‘thin’ concrete slab...)
  - Beam line constructed at LPSC for future...



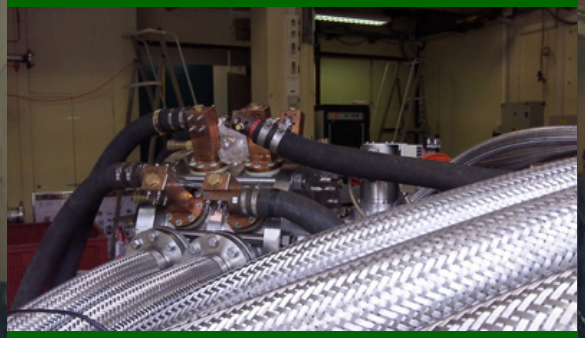


- A lighter magnet is used (lower acceptance)





What one can see in Grenoble now...?

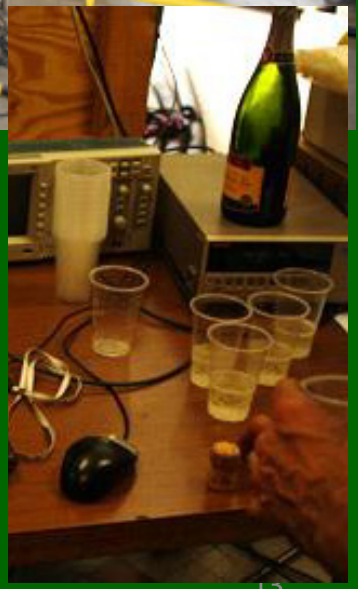



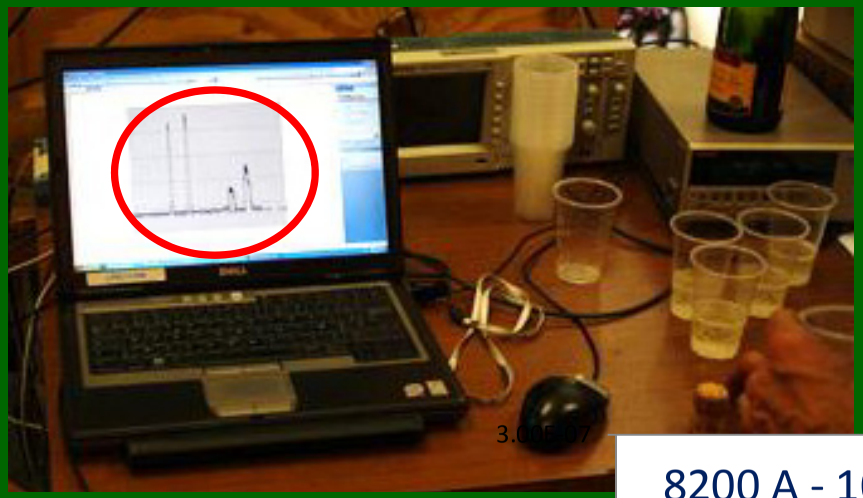


A strange animal from the mountains: the **protoctopus**...

Final experimental setup for first plasma

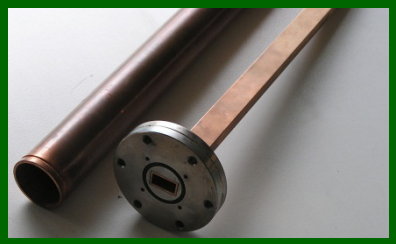
The chief a bottle...
WHY ?

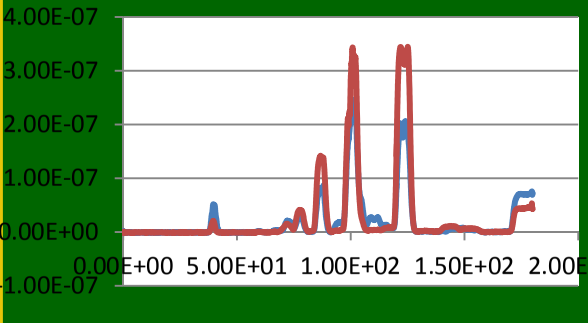


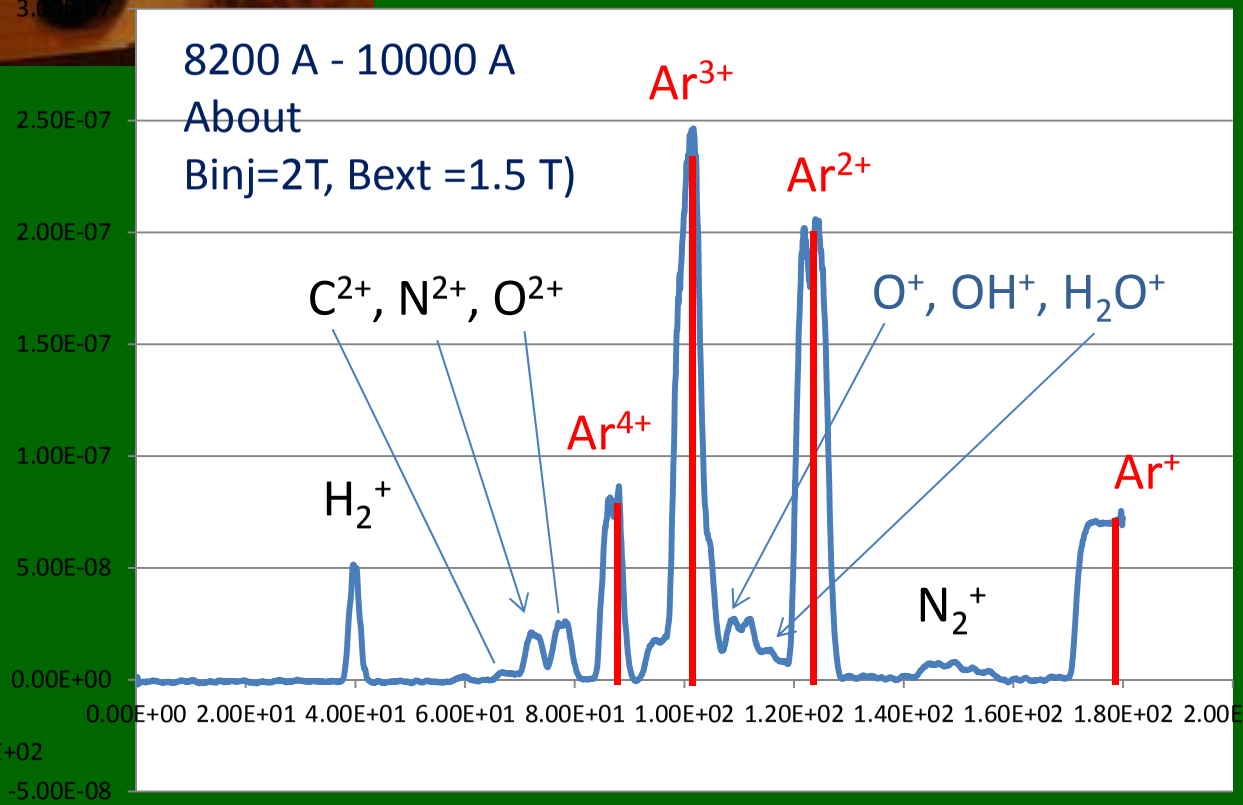


The second part of the photo...

First spectra: Friday 18 GHz 16 W -1mA
Yesterday 200 W



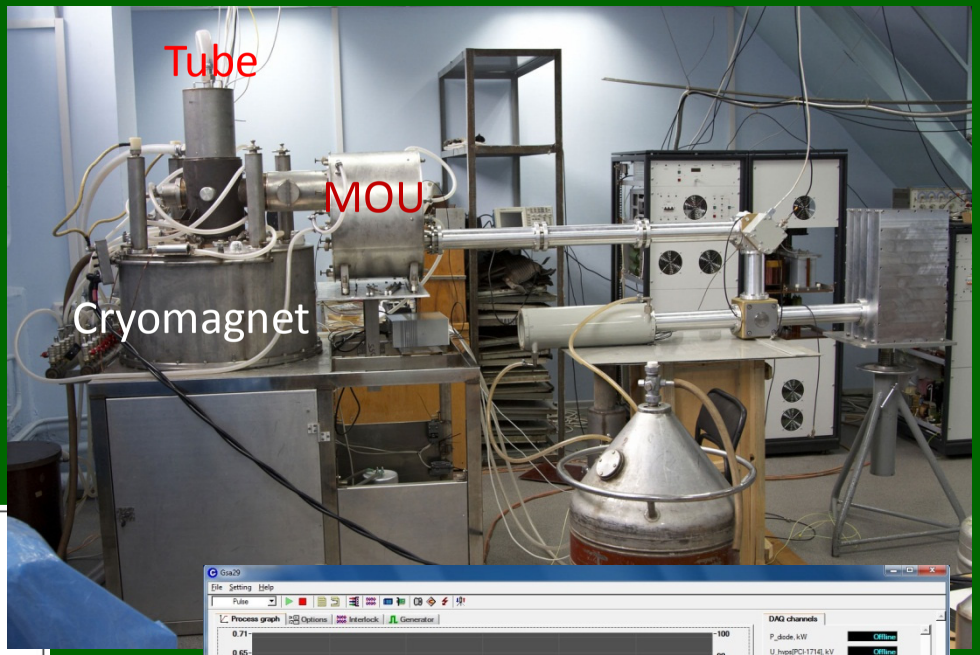


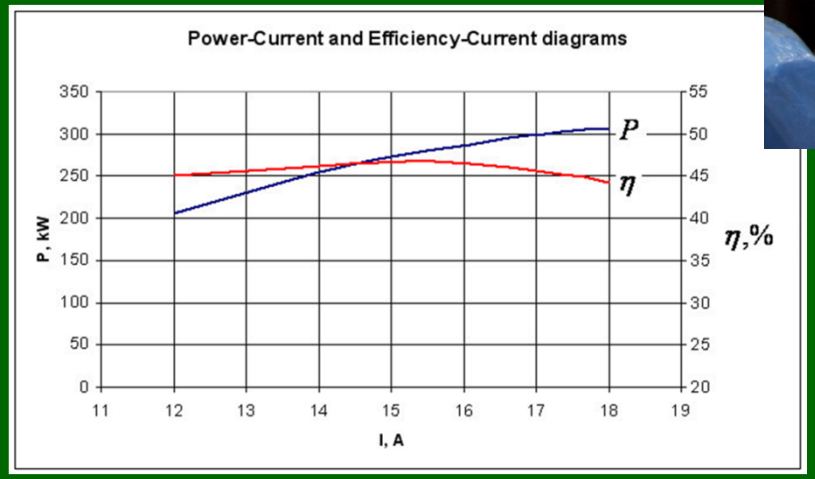


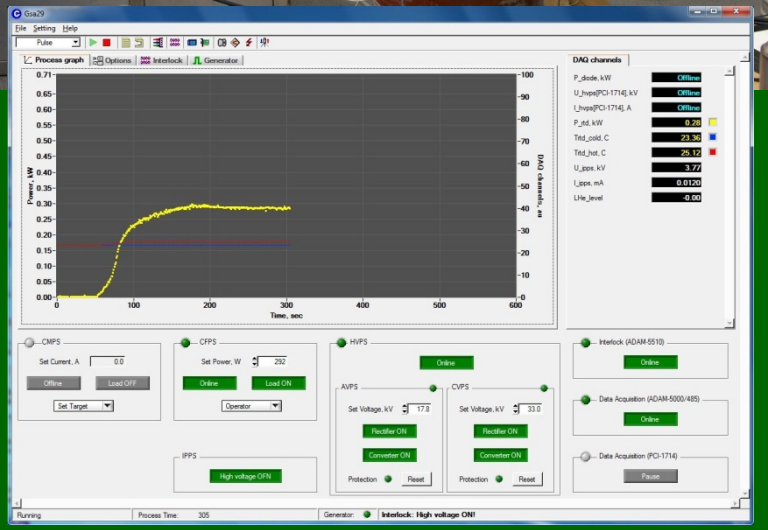
60GHz gyrotron delivery on November 5th

2010-2012 ISTC project #3965

GYCOM Ltd, Nizhny Novgorod, Russia





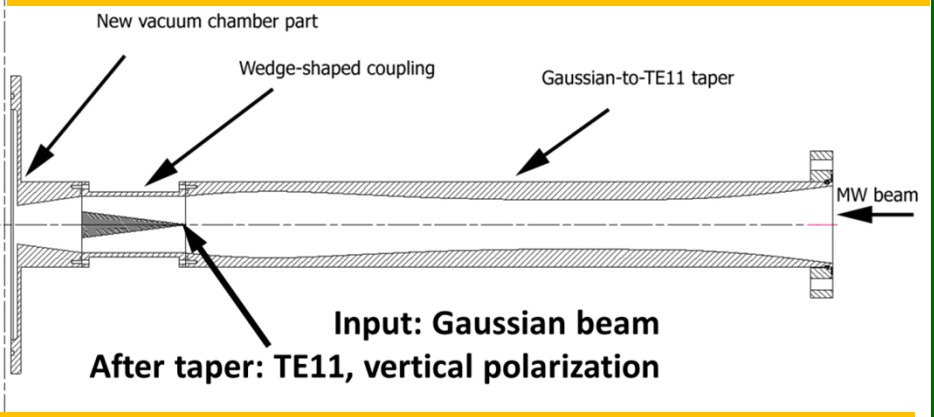


Design of a first 60GHz microwave launch

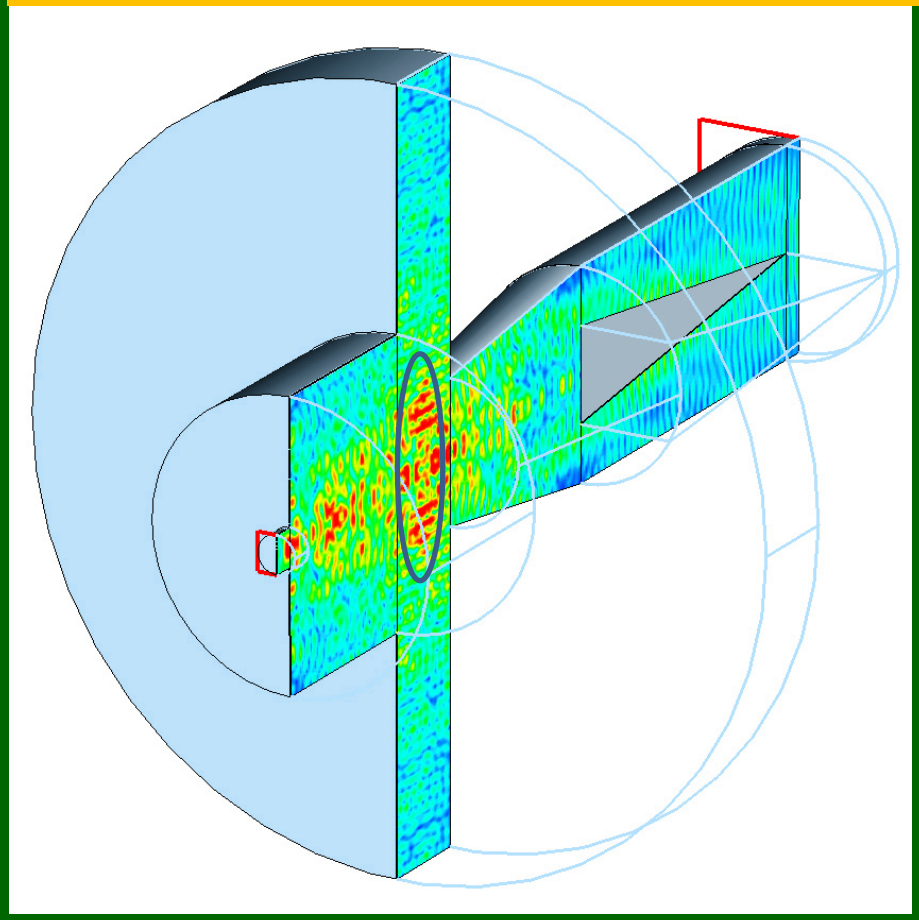
0476887863

Design and simulations performed by I. Isotov (IAP-RAS)

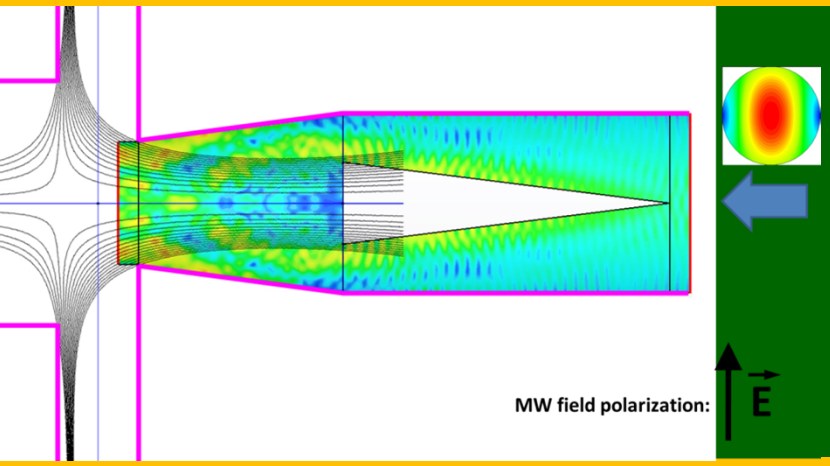
1°) Optimal power transmission (96%)



2°) Maximum power within closed ECR zone



3°) Chamber used as a plasma limiter



60 GHz magnetic configuration needs to be precisely known for launch design

Future plans

2012

October	18GHz beam tests
November	60GHz gyrotron delivery, building and tests Magnetic field map @ 30000 A (for 60GHz operation)
December - March	Microwave launch final design and construction Possible change of the helices slit insulators

2013

March	60GHz beam tests
September	PhD project funded by LPSC (IN2P3) and LNCMI (INP) Investigation of new magnetic structure designs
·····	Construction and test of a 60GHz minimum-B ECRIS

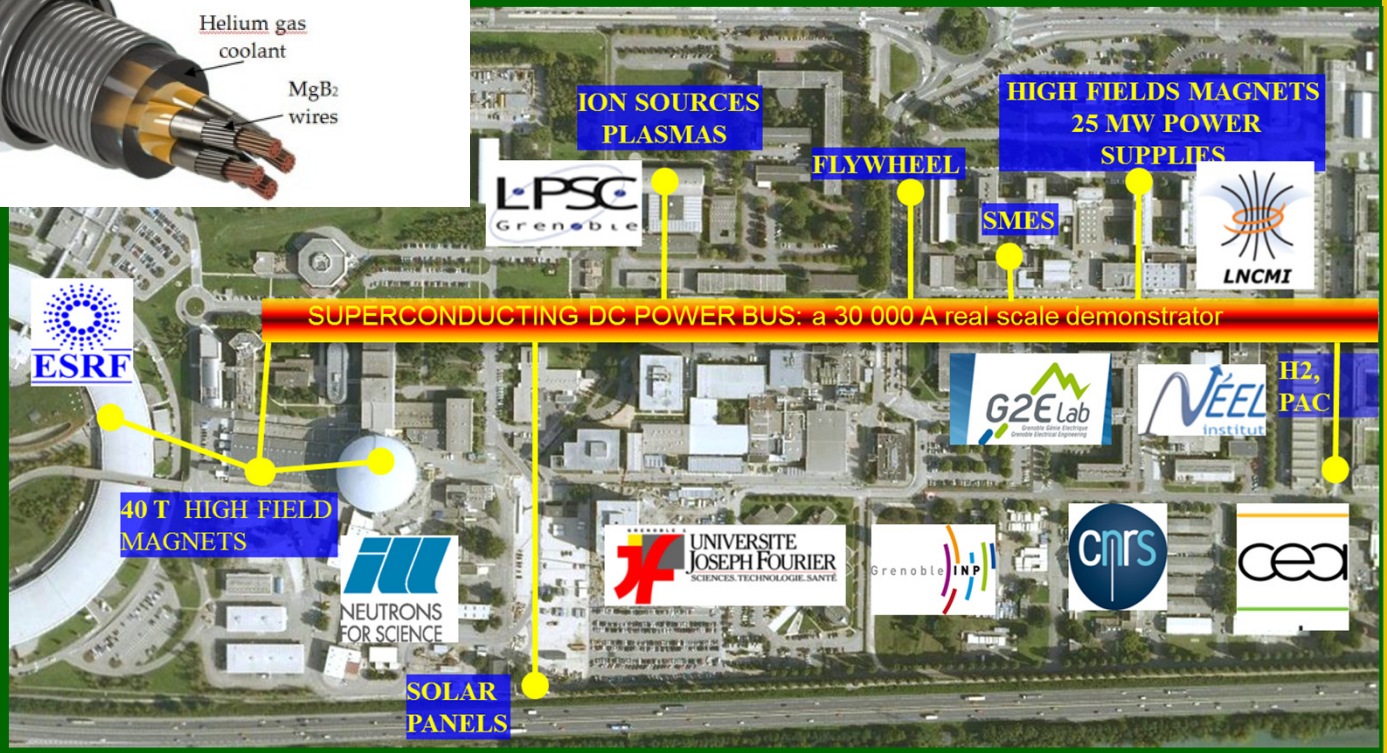
Perspectives

COLOSSECRIS-COLOSSUS project

(4*15000 A) transported by superconducting cables (MgB_2)

High frequency ECRIS R&D, intense magnetic fields (40T) at ESRF (X-rays) and ILL (n)

2 cryostats
800 meters long
Diameter 163 mm



A team work !
Thank
You !