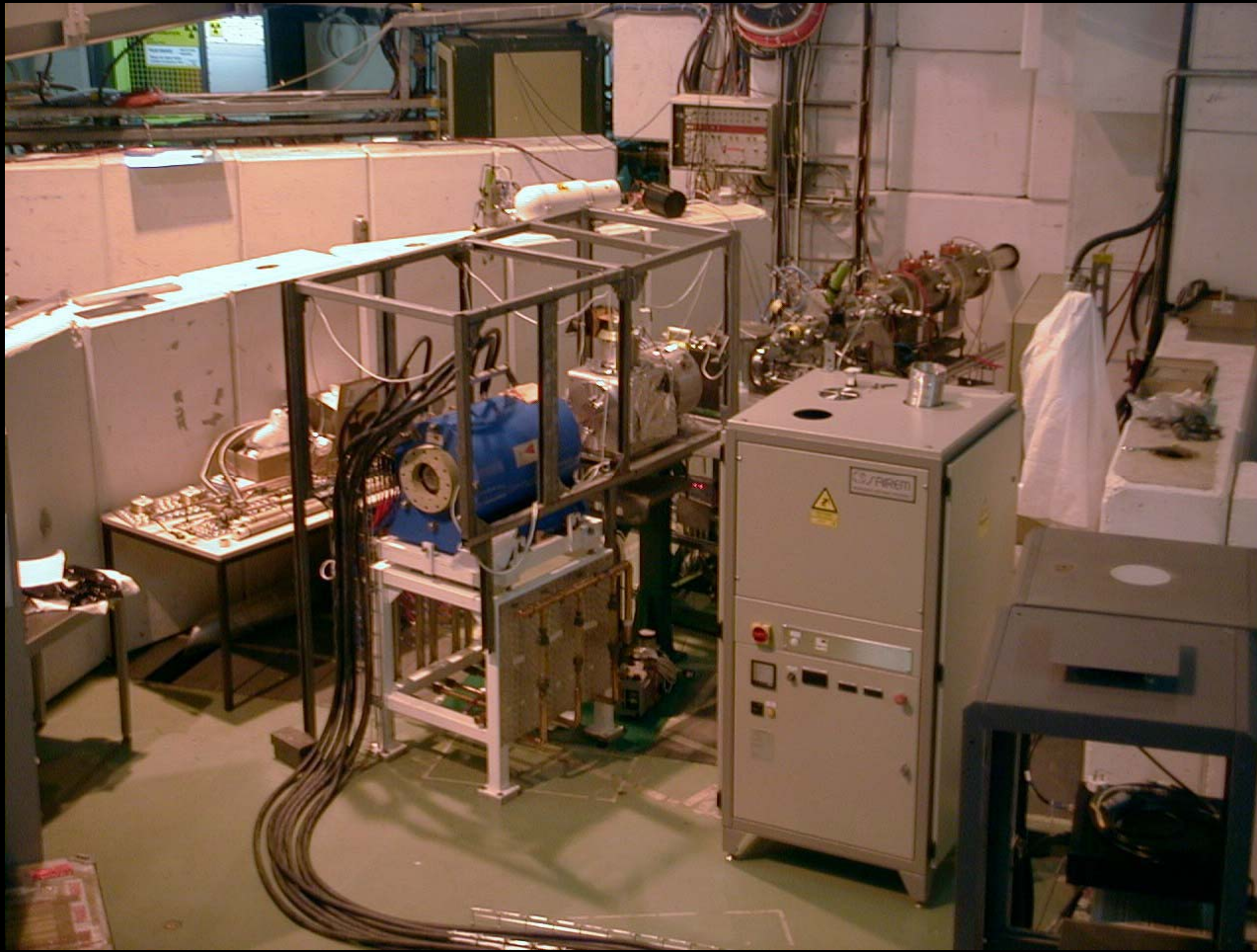


# The Phoenix ECR as a charge breeder for REX-ISOLDE? One of the issues of the HIE project



Pierre, REX's day after, 15/04/2005

# Current status

## **Some results obtained during last year /Tomas Fritioff**

- Some stable beam has been successfully charge-bred  $^{40}\text{Ar}$ ,  $^{84}\text{Kr}$ ,  $^{132}\text{Xe}$
- up to 10% efficiency for  $6 < A/q < 7$
- currents up to 50 nA from separator.  $> 10\text{mA}$  with gas injected!
- Radioactive ions were injected  $^{94}\text{Rb}$ ,  $^{96}\text{Sr}$ ,  $^{130}\text{In}$ ,  $^{130}\text{Cs}$  +  $^{46,47,48}\text{Ar}$ ,  $^{92}\text{Kr}$ ,  $^{138,142,144}\text{Xe}$
- efficiencies up to 4%

## **Some improvements needed:**

- The stable background is very high – up to  $10\mu\text{A}$  in one charge state
- Some radioactive background from the GPS leaking into the ECR (!)
- Efficient charge breeding of light masses is difficult

## **Some ideas**

- UHV ECR** 2005 – 2006 step by step optimization
- Improvement of the vacuum system on the separator side (short term development - next month)
- **Afterglow** for pulsed mode of the ECR,
- A magnetic dipole + electrostatic bender system (long term development 2008)
- Charge breeding of new beams/ **Na? + NUPECC isotopes IS397**
- Comparison of performances ECR/EBIS trap with typical beams in IS397

# ECR schedule 2005

In discussion with Thierry Lamy

ID	Task Name	Duration	Start	28 Mar '05							25 Apr '05							23 May '05							20 Jun '05							18 Jul '05							15 Aug '05							12 Sep '05							10 Oct '05							07 Nov '05						
				S	T	M	F	T	S	W	S	T	M	F	T	S	W	S	T	M	F	T	S	W	S	T	M	F	T	S	W	S	T	M	F	T	S	W	S																											
1	Improving vacuum GHM	1 mon	Thu 31/03/05	■ Pierre;Sophie Meunier																																																														
2	Ion source installation study	1 mon?	Fri 01/04/05	■ Pierre;ISOLDE technician																																																														
3	drawings ion source	6 wks?	Fri 29/04/05	■ Pierre;ISOLDE technician[50%]																																																														
4	ordering, delivery time	2 mons	Fri 10/06/05	■ Pierre																																																														
5	Installation ion source	1 mon	Fri 05/08/05	■ Pierre;ISOLDE technician;Sophie[50%]																																																														
6	New HF window?	2 wks	Tue 12/04/05	■ Pierre;Thierry;Pascal[50%]																																																														
7	Ordering and delivery 60 kV p	8 wks	Fri 15/04/05	■ Pierre;Thierry[50%]																																																														
8	Consolidation 60kV	2 wks	Fri 10/06/05	■ Pierre;Thierry[50%];summer student?[50%]																																																														
9	design UHV chamber	4 wks?	Fri 15/04/05	■ Thierry;Pascal[50%]																																																														
10	Ordering chamber - delivery t	8 wks	Fri 13/05/05	■ Pierre[10%];Thierry[5%];Pascal[5%]																																																														
11	Mounting chamber	10 days	Fri 08/07/05	■ Pierre;Thierry;Pascal[50%];Toma																																																														
12	IS 397 stable beam Afterglow	2 mons?	Fri 22/07/05	■ Pierre;Thierry;Pascal[50%];Toma																																																														
13	IS 397 radioactive beamtime	7 days?	Fri 16/09/05	■																																																														
14	Full UHV ECR	4 mons	Fri 22/07/05	■ Thierry																																																														



No special support needed



Some support from LPSC – exchange of ideas - designs



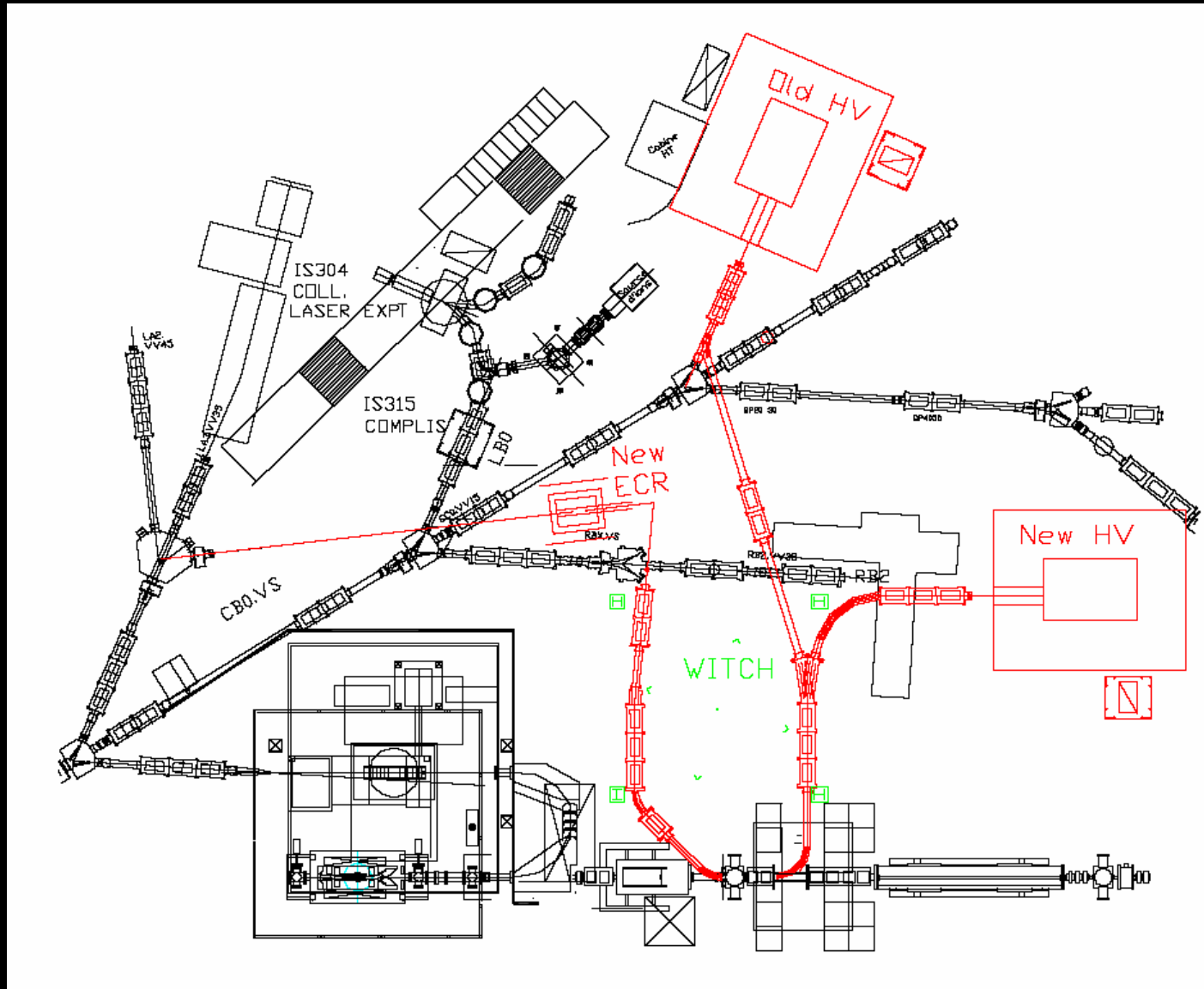
Some presence of LPSC at ISOLDE can be required – strong support needed



Presence at CERN is necessary

Next week: addendum for IS397

# In the frame of the High Intensity and Energy project at ISOLDE



# What advantages? What constraints and requirements?

## **A new charge breeder for REX-ISOLDE**

- high intensities are not a problem any longer – space charge capacity is very high
- a considerably simpler device to set-up than REXTRAP and EBIS combination, robust and reliable
- both EBIS and ECR would be available for astrophysics and solid state physics experiments

### **Some constraints however:**

- Depending on the progress made with the background issue, the ECR could be limited to rather intense beams
- The light masses breeding might stay a problem
- The complementarities of EBIS and ECR would have to be fully employed

### **Some requirements**

- Pulsed mode of the ECR – Afterglow method. Confinement time 70-200ms. Extraction time 5ms.
- Injection into the Linac with high  $A/q > \sim 6$ . Redesign of the RFQ + IH inner structures + lenses with UNILAC-type. Inserting a stripper foil after the IH structure. May be done during the 5.5 MeV upgrade?