Beam developments in 2011

Target and Ion Source Development (TISD)

Thierry Stora, EN-STI-RBS

With input from many different colleagues

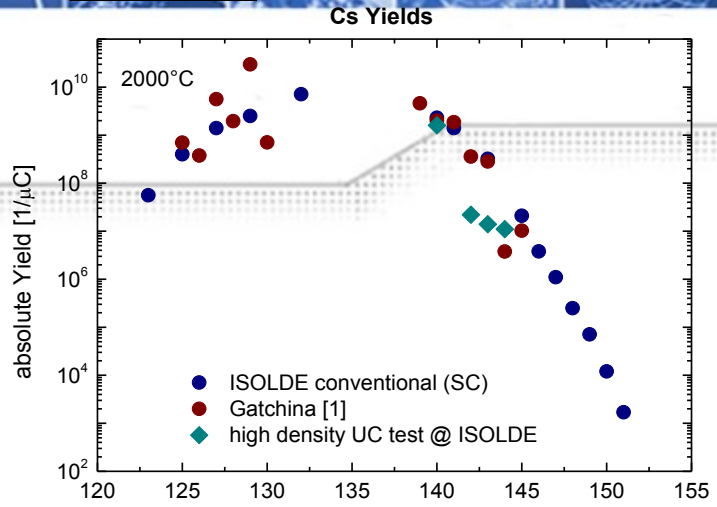
From last meeting

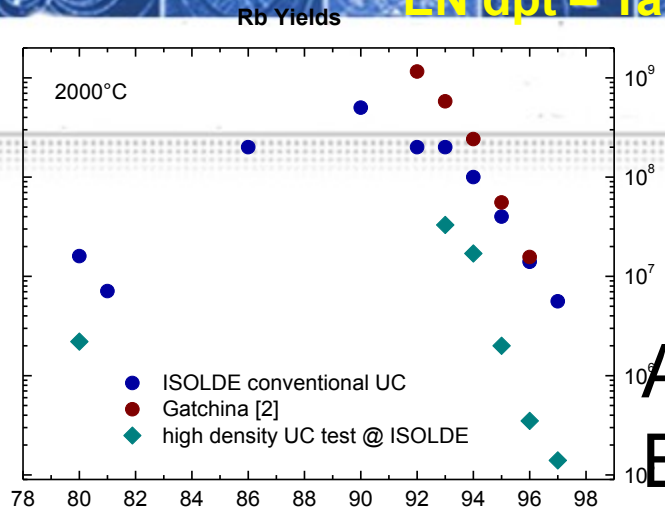
- 30Na beam (recover historical yields)
- 72Kr successful production
- Production of 8B
- Completion of 142Sm beam development

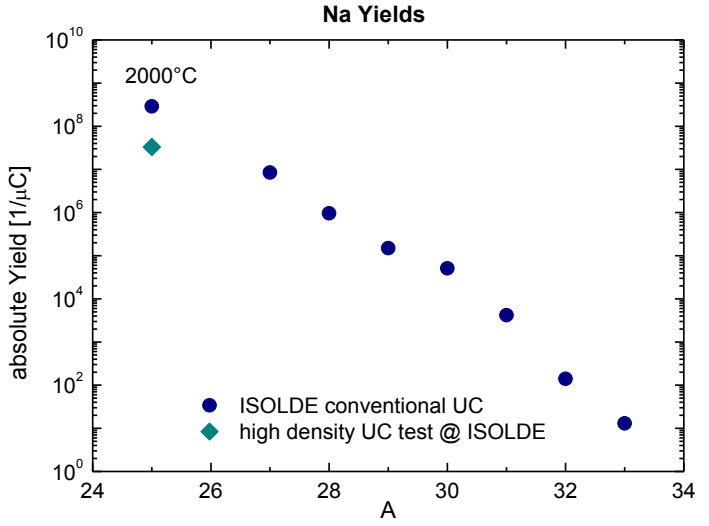
In addition

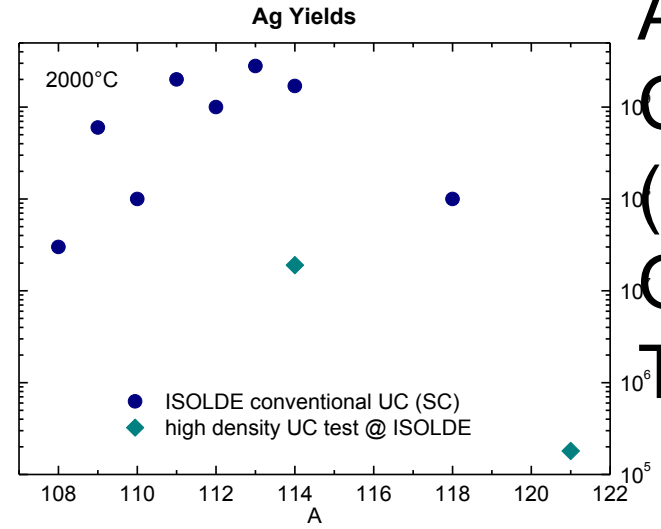
- 9C ongoing development
- Potential of VADIS/target

Yields from HD UC









A. Gottberg
ENSAR
ActILab
Collab
(&PNPI,
ORNL,
TRIUMF)

[1] V. N. Panteleev, et al., Eur. Phys. J. A **42**, 495-501 (2009)

- Comparable absolute yields (Gatchina 91g/cm^2, conventional ISOLDE ≈45g/cm^2)
- HD absolute yields @ ISOLDE (241g/cm^2) x2 to x10 lower than from conventional UC targets

142Sm

Scheme for RILIS Sm beam developped and tested this year in standard W cavity.

140Nd in GdB6 delivered for physics last week, > 50% in the beam confirmed.

Ready to test in GdB6 cavity to assess 142Sm intensity and purity

Potential of target-VADIS units

Confirmation of low levels of 35Cl for 35Ar for WITCH, but still not trivial to achieve.

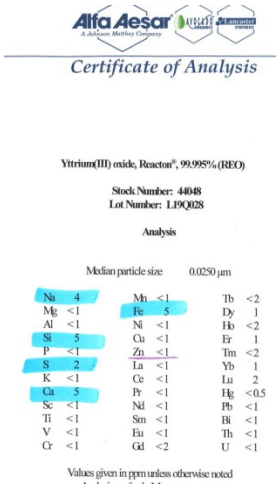
Y2O3 new material grade: Cl reduced, but not totally suppressed (and not assessed).

Confirmed improved yields of 56,57Co, 53Fe, 61Cu(new), 48Cr.

Ok for 73As(EC), 57Co (Mossbauer),
not for 75Se(EC), 77Br(PAC).

Still too much contaminants (75, 77 CaCl, 48Ca)

96Kr : Full Tantalum VADIS. Miss diagnostics to probe these low level beam intensities


Alfa Aesar
A Johnson Matthey Company

Certificate of Analysis

Yttrium(III) oxide, Reacton®, 99.995% (REO)

Stock Number: 44048
Lot Number: L19Q028

Analysis

Median particle size 0.0250 µm

Na	4	Mn	<1	Tb	<2
Mg	<1	Fe	5	Dy	1
Al	<1	Ni	<1	Ho	<2
Si	5	Cu	<1	Er	1
P	<1	Zn	<1	Tm	<2
S	2	La	<1	Yb	1
K	<1	Ce	<1	Lu	2
Ca	5	Pr	<1	Hg	<0.5
Sc	<1	Nd	<1	Pb	<1
Ti	<1	Sm	<1	Bi	<1
V	<1	Eu	<1	Th	<1
Cr	<1	Gd	<2	U	<1

Values given in ppm unless otherwise noted

8B beams (9C beams)

This is part of C. Seiffert's PhD.
Carbon beams (9C, n-rich C) are first addressed (easier).

Beam time planned for n-rich C beams and ECR source IS449

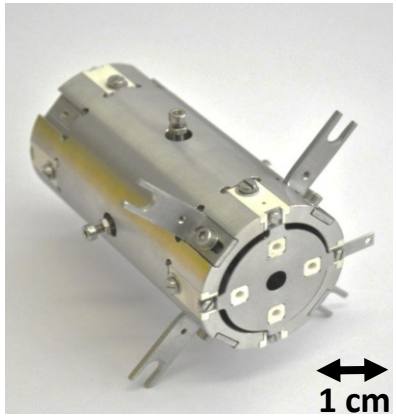
CaO nanomaterials (JP Ramos Master/PhD thesis)

72Kr beams

Beam time scheduled in summer: New purity grade Y2O3
But main issues is low intensity beam diagnostics.

However, there is expectations to gain a further x4-x8 (from the 2^e4/muC) from the molten NaF target to be operated for IS 509

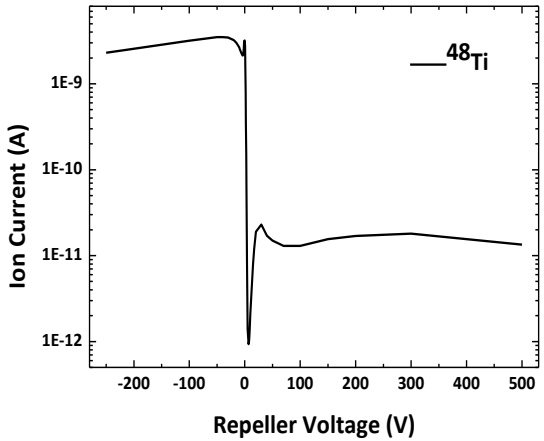
First On-Line Test of Laser Ion Source and Trap at ISOLDE

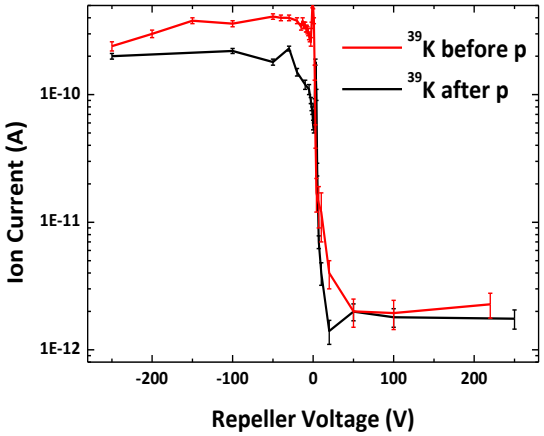


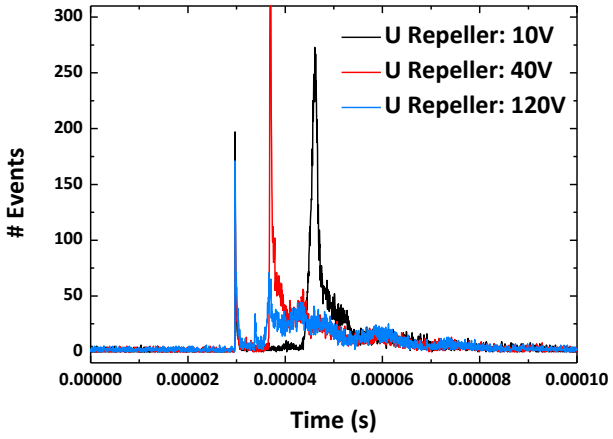
First on-line test of performance of the Laser Ion Source and Trap (LIST) at ISOLDE from 11/05/2011 untill 13/05/2011

- LIST was implemented successfully at ISOLDE
- LIST worked well over 2 days of proton taking
- Measurement of
  - ➢ suppression of isobaric contaminants
  - ➢ ionization efficiency
  - ➢ yields of different isotopes etc.

Preliminary Results:







➡ **Maximum Surface Ion Suppression of ≈ 3000**

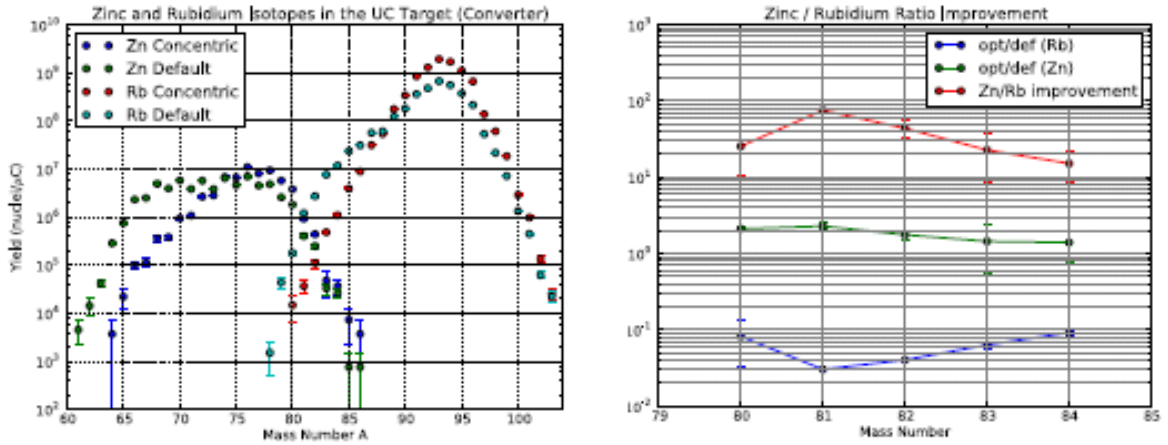
➡ **No significant change of performance after two days with protons**

➡ **Different time of flight structures for different LIST settings**

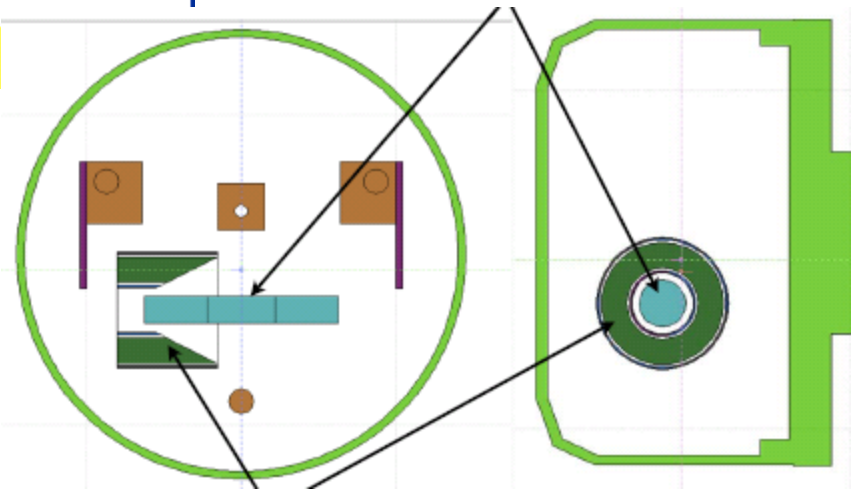
D. Fink, RILIS group, Mainz group, TISD group

Improvement of fission fragment production

Concentric UCx Target – Zn and Rb Yields (preliminary results)



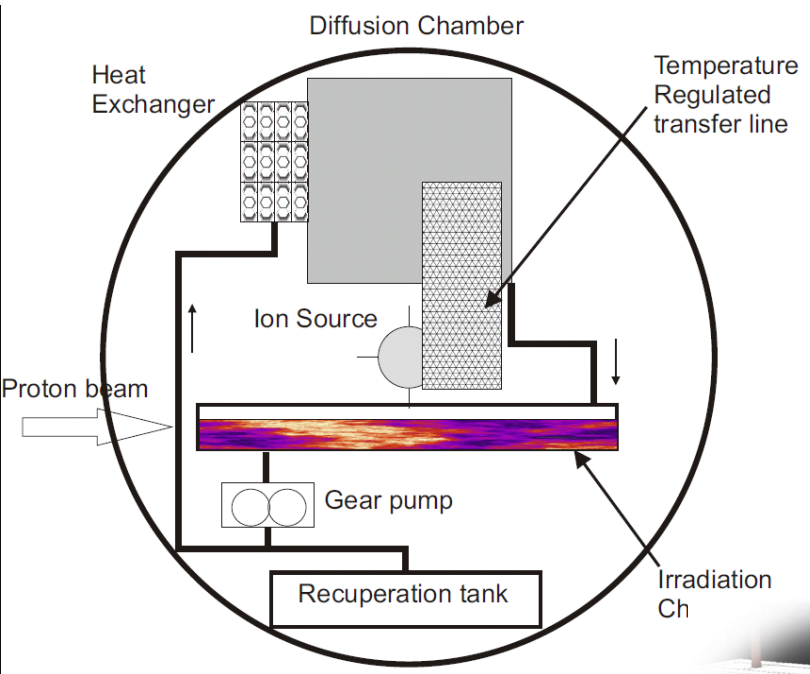
- $^{80}Zn/^{80}Rb$ ratio is improved ~25 times (slightly more than in previous optimization)

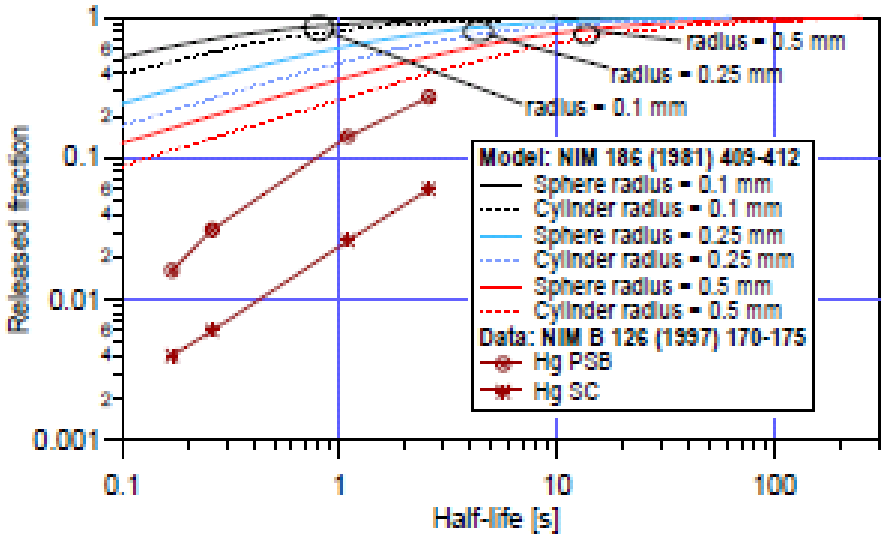


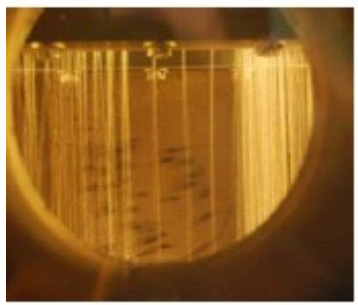
R. Luis et al., ITN

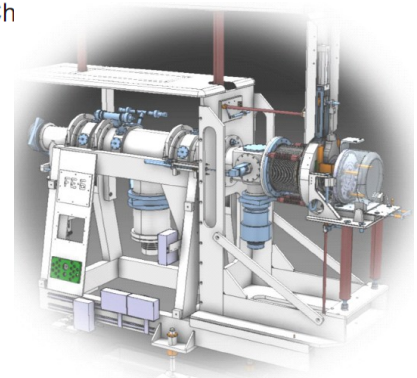
Test of a molten Pb/Bi target loop at CERN-ISOLDE for EURISOL

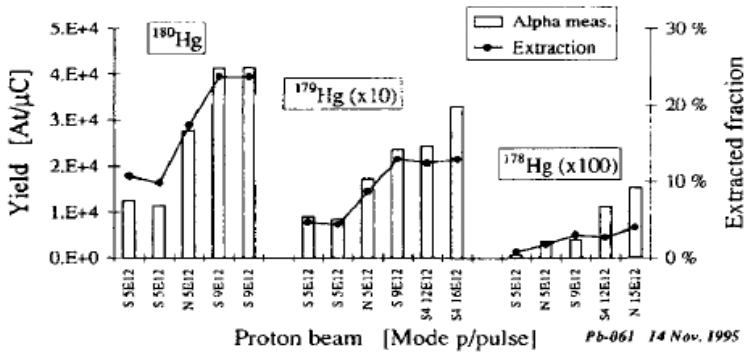
EURISOL Design Study

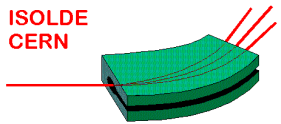












Collaboration

Institutes	Role in the collaboration	Contact person(s)
LENAC/SPhN/IRFU, CEA, Saclay (FR)	Safety file (neutronics)	V. Blideanu, M. Garcon
ESS AB, (SW)	Neutron spallation liquid metal target	E. Noah, F. Plewinski
IPUL, Salaspils (LV)	*Liquid metal loop technology*	*E. Platacis, J. Freiberg*
PSI, Villingen (CH)	*Radiochemistry, Pb/Bi target*	*J. Neuhausen, D. Schumann, M. Wohlmuter*
ISOLDE, EN-STI, CERN (CH/EU)	Online tests, ISOL targets	T. Stora (coord.) A. P. Bernardes
Myrrha, SCK-CEN, Mol (BE)	Pb/Bi targets	P. Schuurmans, L. Popescu, P. Baeten

M1-6	7-12	13-18	19-24	25-30	31-36	Cool Down	CD +1-6
Design	Design	Design					
		Safety file	Safety file	Safety file	Safety file		
			Construction	Adaptation			
			Off-line test	Off-line test			
					Online test		
						Final report	
						Cool-down	PIE
							PIE report