

Existing ISOL beams

H	1	Isotopes with $T_{1/2} < 0.1$ s separated																		2
Li	3	Isotopes with $T_{1/2} < 10$ s separated																	He	
Na	11	Isotopes with $T_{1/2} > 10$ s separated																	10	
K	19	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	36		
Rb	37	Sr	Y	Zr	Nb	41	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	54	
Cs	55	Ba	La	Hf	Ta	73	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	86	
Fr	87	Ra	Ac	89	Rf	104	Db	106	Bh	Hs	Mt	109	110	111	112					

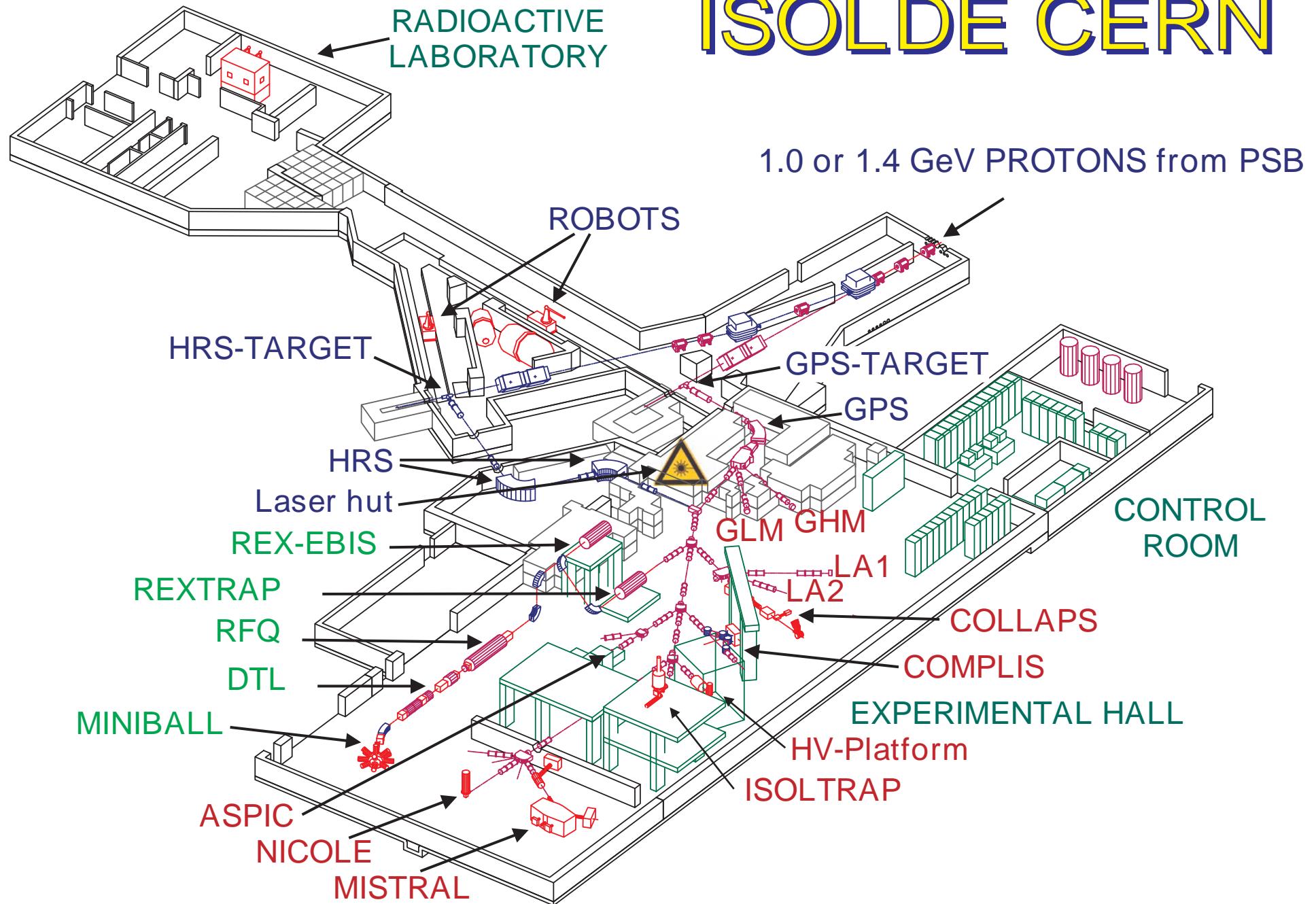
58	Pr	59	Nd	60	Pm	61	Sm	62	Eu	63	Gd	64	Tb	65	Dy	66	Ho	67	Er	68	Tm	69	Yb	70	Lu	71	
Th	90	Pa	91	U	92	Np	93	Pu	94	Am	95	Cm	96	Bk	97	Cf	98	Es	99	Fm	100	Md	101	No	102	Lr	103

Group 8-18 element beams available at ISOLDE

"Pure" beam from RILIS or surface ionizer (only 1+)																	
"Pure" beam from plasma ion source (1+, 2+..)																	
Mixed beam from plasma ion source (1+, 2+..)																	
Indirectly produced as decay daughter																	
1 H	3 Li	4 Be	5 B	6 C	7 N	8 O	9 F	10 Ne	11 Na	12 Mg	13 Al	14 Si	15 P	16 S	17 Cl	18 Ar	2 He
19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr
37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe
55 Cs	56 Ba	57 La	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn
87 Fr	88 Ra	89 Ac	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110	111	112	113	114	115	116	117	118

58	59	60	61	62	63	64	65	66	67	68	69	70	71
Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
90	91	92	93	94	95	96	97	98	99	100	101	102	103
Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr

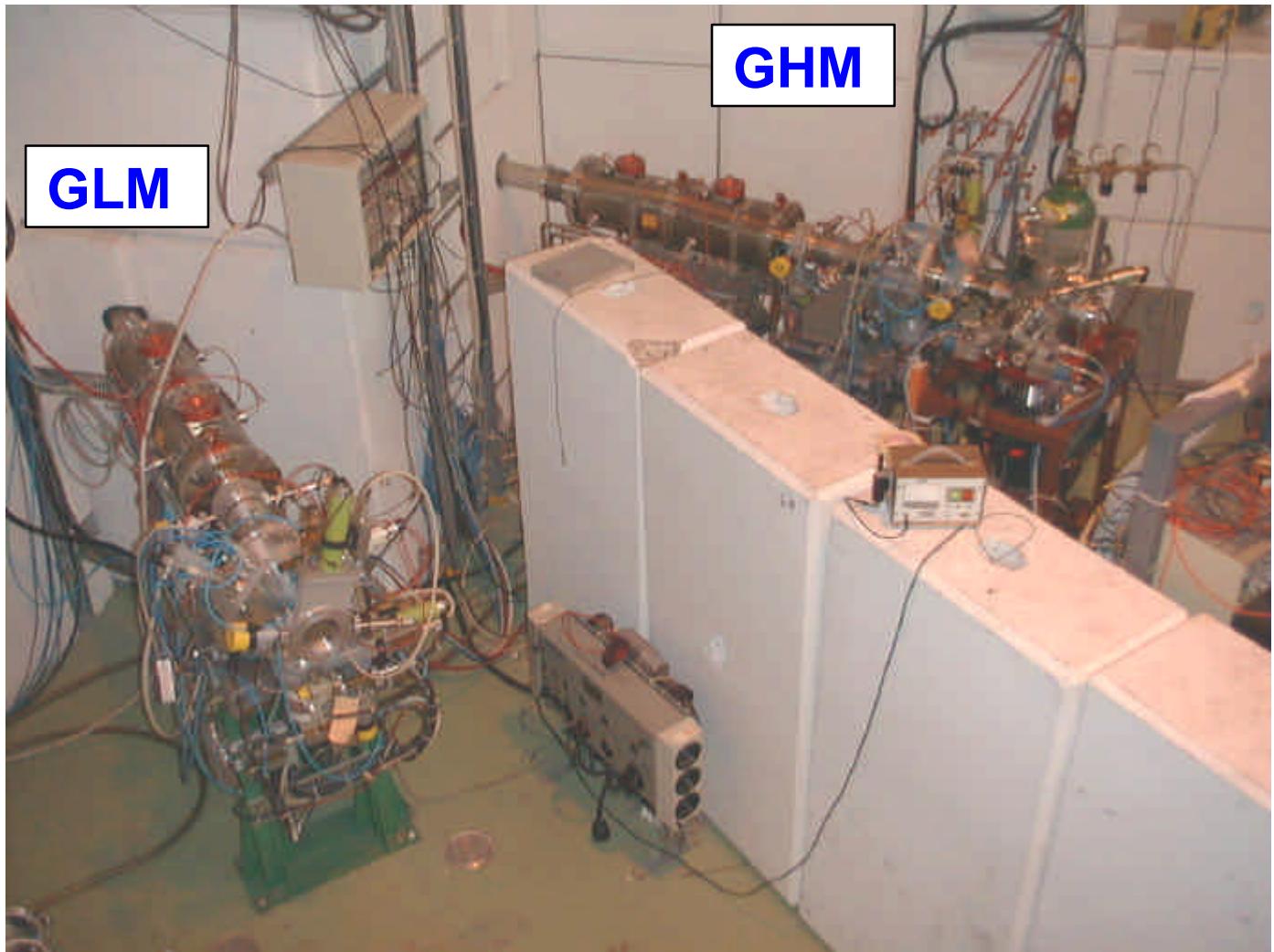
ISOLDE CERN



Possible set-ups at ISOLDE

1. at GLM (or GHM)

- 60 q•keV beams
- > 2 m • 2 m • 3 m floorspace available
- "parasitic" use of Cd, Hg, Tl, Fr, ...
beams several times per year



2. on high voltage platform

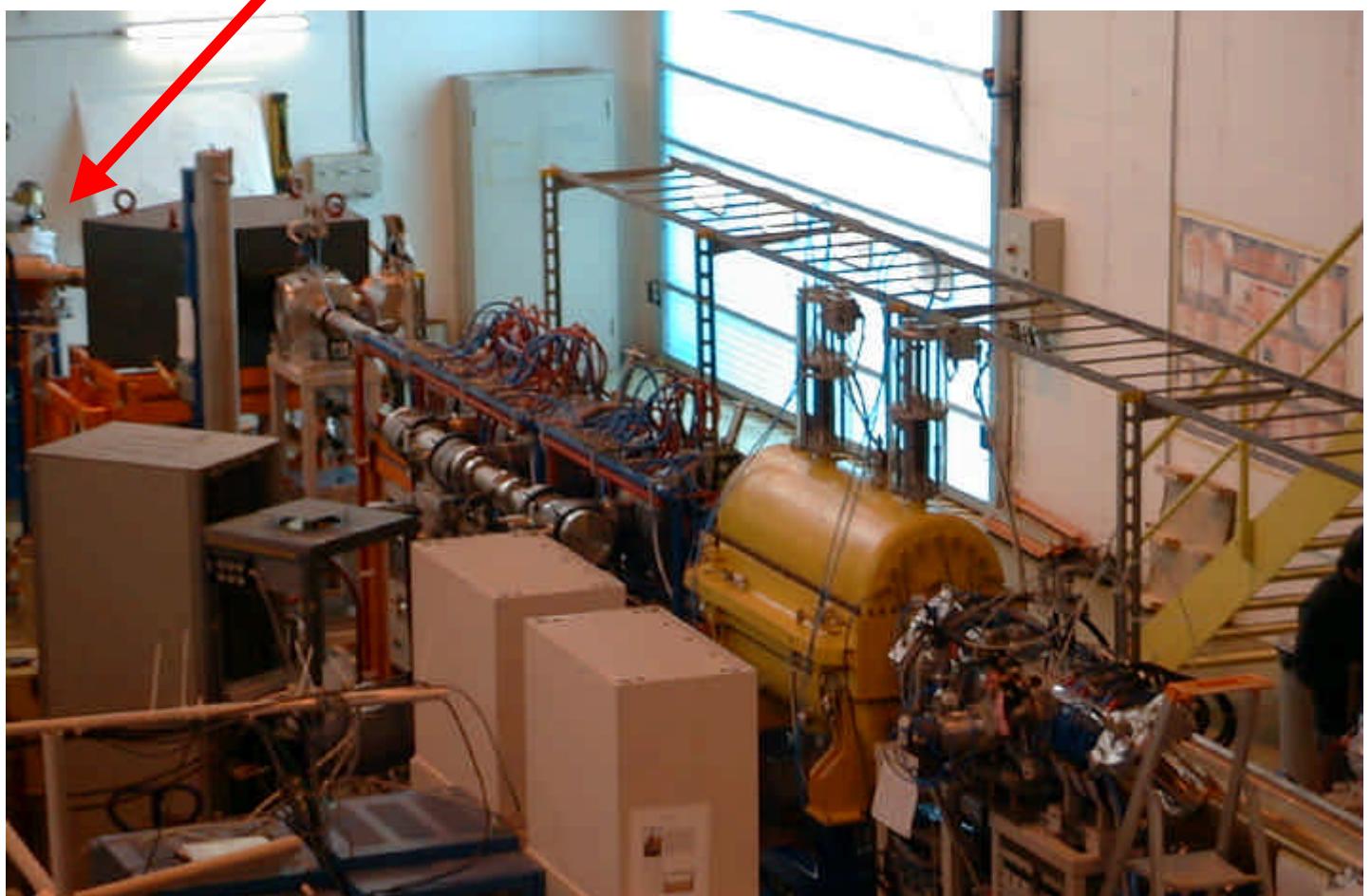
- up to 260 q•keV beams
- 1.2 m • 0.8 m • 1.4 m space available
- requires central beamline, i.e. no "parasitic" shifts



3. behind REX-ISOLDE

- 300 A•keV with RFQ only
- 1.1-2.2 A•MeV with full LINAC
- up to 3.1 A•MeV with upgrade in 2003
- 2 m • 2 m floorspace available
- requires central beamline plus REX operation
- total REX efficiency >1% (conservative)

second beamline



Suitable isotopes for on-line chemistry experiments

decay detectable with Si detector

decaying with sufficient B.R. via α or βp

sufficiently "clean" beams to avoid excessive isobaric background (α , β and γ)

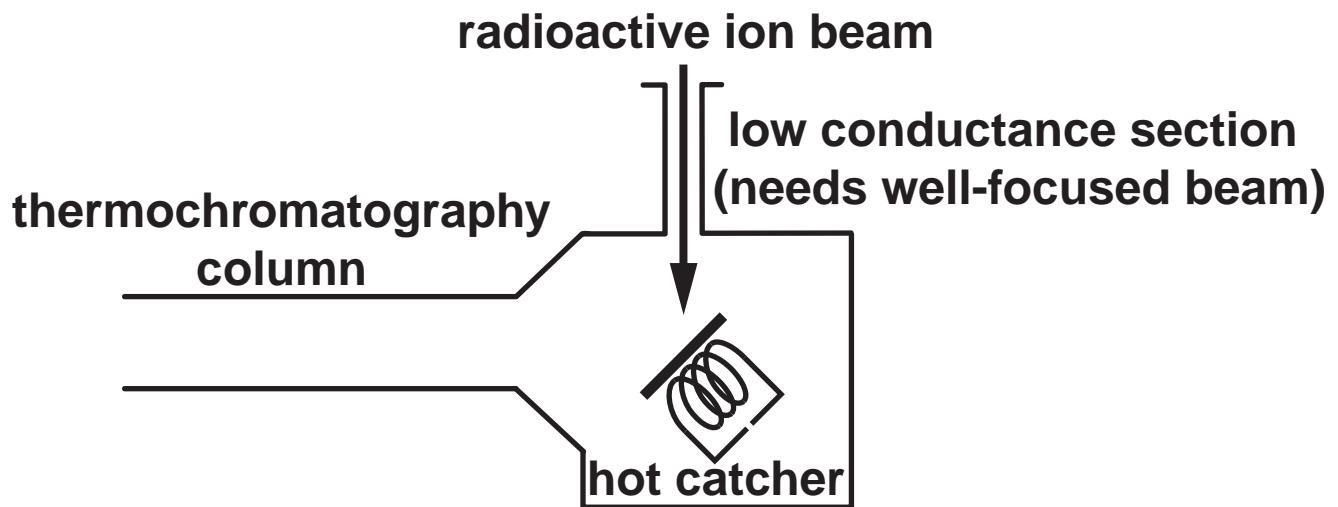
Isotope	$T_{1/2}$ s	Decay	E($\alpha, \beta p$) (MeV)	B.R. %	Method	< 260 keV		520 keV	REX
						Ions/s	α or βp per s	2+ ions	
Os 170	7.3	α	5.40	8.6	MK3: 178Hg>Pt>Os	9E+1	8E+0	8E-1	9E-1
Os 172	19.2	α	5.10	1.1	MK3: 180Hg>Pt>Os	2E+4	2E+2	2E+1	2E+2
Ir 176	8	α	5.12	2.1	MK3: 180Hg>Pt>Ir	3E+4	6E+2	6E+1	3E+2
Pt 176	6.33	α	5.75	38	MK3: 180Hg>Pt	5E+4	2E+4	2E+3	5E+2
Pt 178	21.1	α	5.45	7.7	MK3: 182Hg>Pt	1E+6	9E+4	9E+3	1E+4
Au 179	7.1	α	5.85	22	MK3: 179Hg>Au	3E+3	6E+2	6E+1	3E+1
Au 181	14.5	α	5.48	2.7	MK3: 181Hg>Au	3E+9	7E+7	7E+6	3E+7
Hg 180	2.56	α	6.12	48	MK3	1E+5	5E+4	5E+3	1E+3
Hg 183	9.4	α	5.91	25.5	MK3	5E+7	1E+7	1E+6	5E+5
Tl 181	3.4	α	6.18	20	RILIS	7E+2	1E+2		7E+0
Pb 186	4.82	α	6.34	35	RILIS	8E+4	3E+4		8E+2
Pb 188	25.5	α	5.98	8.5	RILIS	3E+6	3E+5		3E+4
Bi 191g	12	α	6.31	60	RILIS	6E+4	4E+4		6E+2
Bi 192g	34.6	α	6.06	18	RILIS	2E+4	4E+3		2E+2
Po 196	5.8	α	6.52	94	MK7: 200Rn>Po	7E+3	6E+3	6E+2	7E+1
Po 198	106	α	6.19	57	MK7: 202Rn>Po	7E+5	4E+5	4E+4	7E+3
At 199	7.2	α	6.64	89	SI: 203Fr>At	4E+5	3E+5		4E+3
At 201	85	α	6.34	71	SI: 205Fr>At	4E+7	3E+7		4E+5
Rn 202	9.94	α	6.64	84	MK7	8E+5	7E+5	7E+4	8E+3
Rn 204	74	α	6.42	73	MK7	3E+7	2E+7	2E+6	3E+5
Ag 96	6.9	βp	1.5 - 4.5	18	RILIS	1E+1	2E+0		1E-1
Cd 99	16	βp	1.5 - 3.5	0.21	RILIS	1E+3	2E+0	2E-1	1E+1
In 100	5.9	βp	1.7 - 4	5	RILIS	2E+1	1E+0		2E-1
Sn 105	34	βp	1.5 - 3	0.01	RILIS	1E+4	1E+0		1E+2
Xe 112	2.7	α	3.22	0.8	MK7	1E+2	8E-1	8E-2	1E+0
Xe 115	18	βp	2 - 4.5	0.34	MK7	6E+5	2E+3	2E+2	6E+3

1. coupling to vacuum thermochromatography set-up

a) with tape and differential pumping

(see contribution by Robert Eichler)

b) directly via ion implantation and thermal desorption from heated catcher (see figure)



2. coupling to gas chromatography set-up

a) with tape and differential pumping

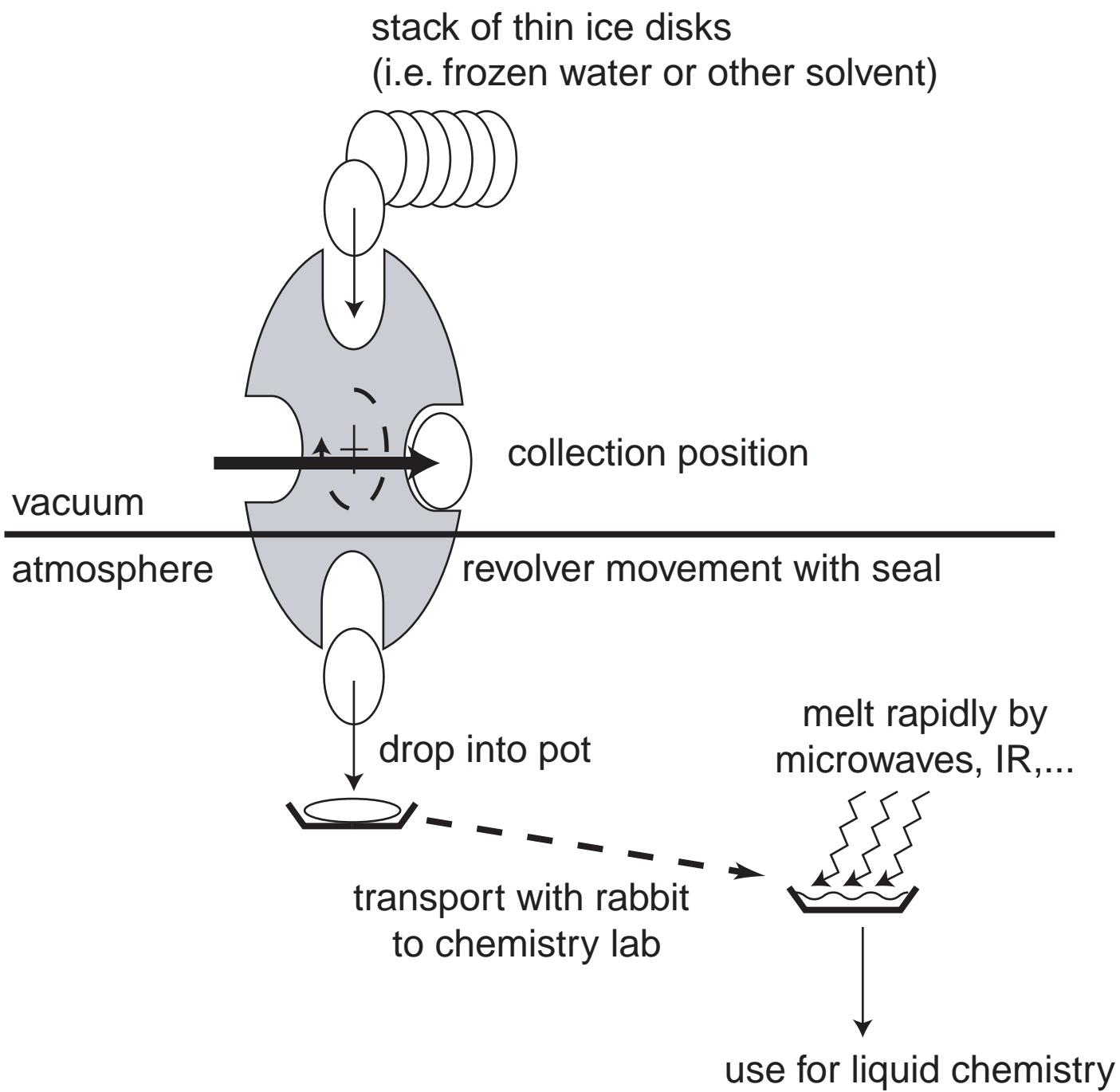
(see contribution by Robert Eichler)

b) implant through window into gas cell

c) implant alpha decay mother into window and use recoils going into the gas cell

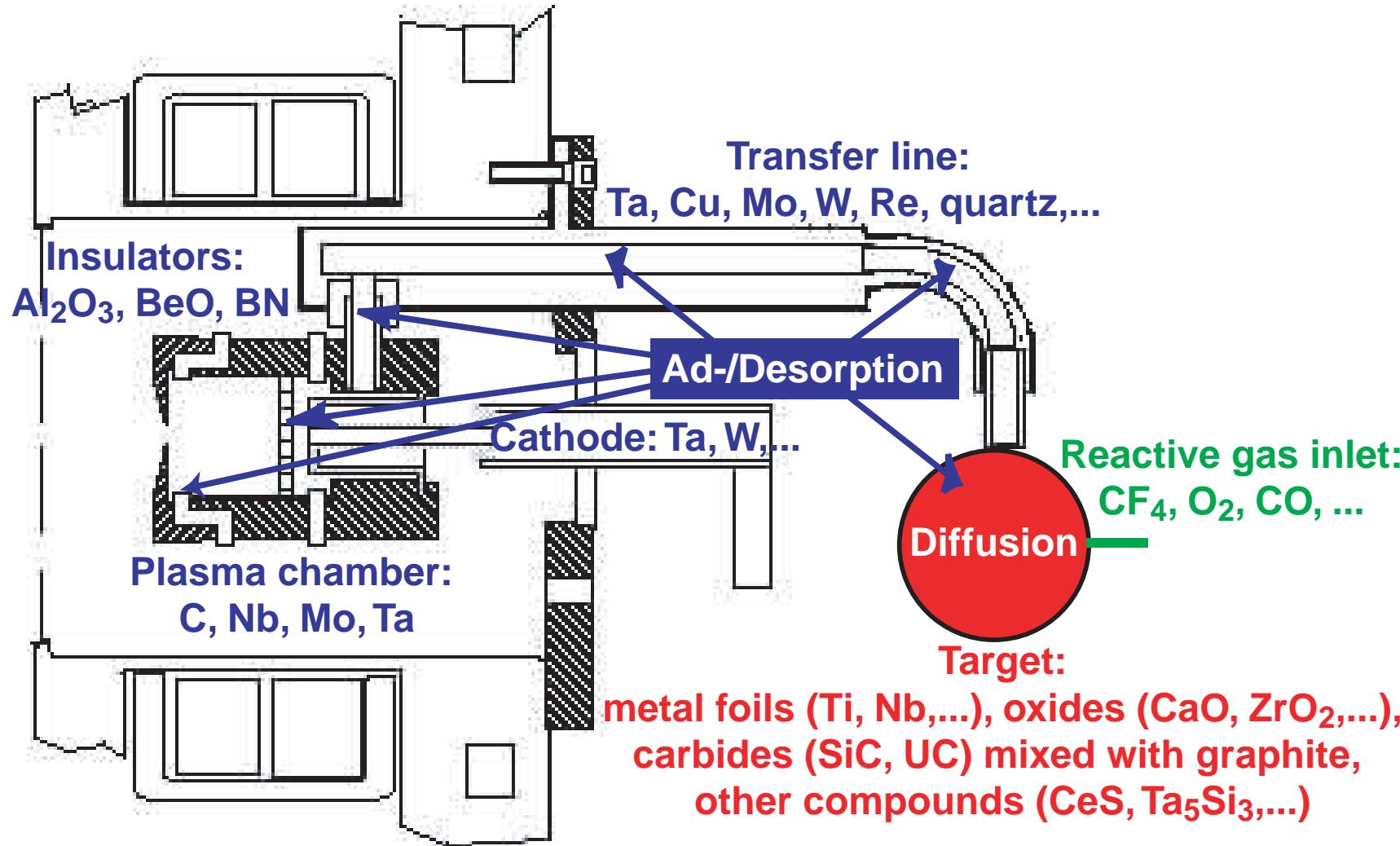
**(used at ISOLDE for laser spectroscopy of Bi isotopes,
J. Billowes and P. Campbell, Hyp. Int. 129 (2000) 289.)**

3. coupling to liquid chemistry set-up



water ice plates on a teflon holder are used as catcher of radioactive ion beams for off-line experiments at ISOLDE:
W. Tröger and T. Butz, Hyp. Int. 129 (2000) 511.

Materials used in ISOL target and ion source units



Positive surface ion source: W, WO_x , Re,...

Cavity of resonance ionization laser ion source and

negative surface ion source: TaC, ZrC, CeO_2 , LaB_6 , Ir_5Ce ,...

TARGISOL

Optimized release from ISOL targets

EU-project HPRI-CT-2001-50033



Introduction

Participating laboratories and contact persons

Operating and planned ISOL facilities

Conferences and workshops

Literature and useful links

TARGISOL meetings

Workplan



[Olof Tengblad](#)

[Manoli Turrión](#)

<http://www.targisol.csic.es/>