

ISOLDE scientific coordinator's report

ISCC meeting, February 16, 2009

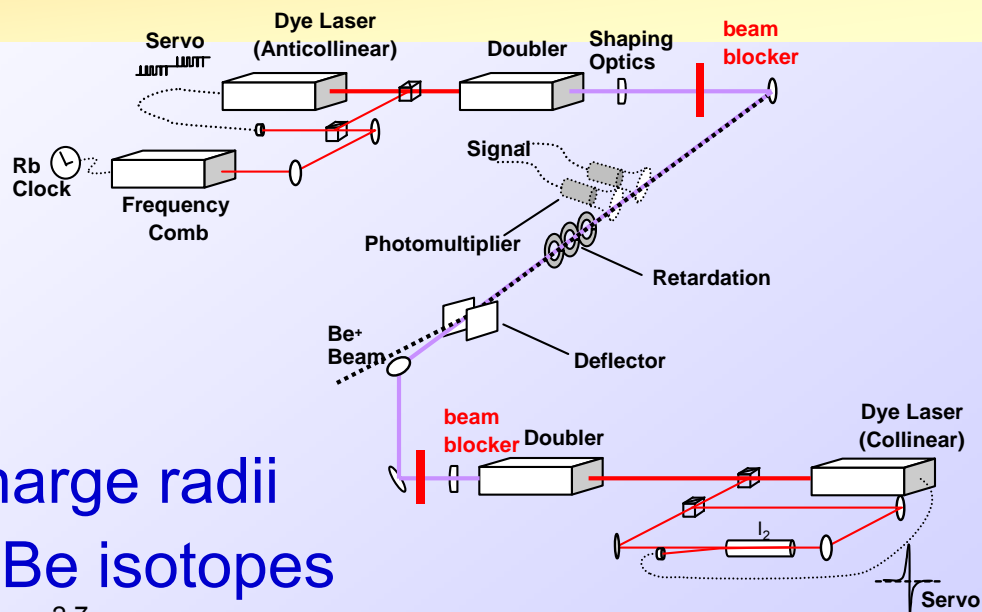
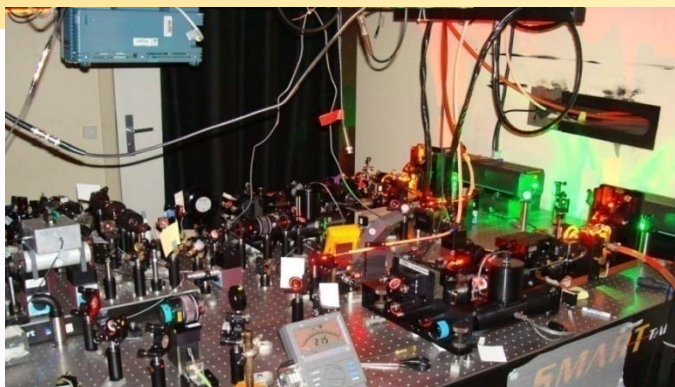
A. Herlert, CERN PH-SME-IS

Running period 2008

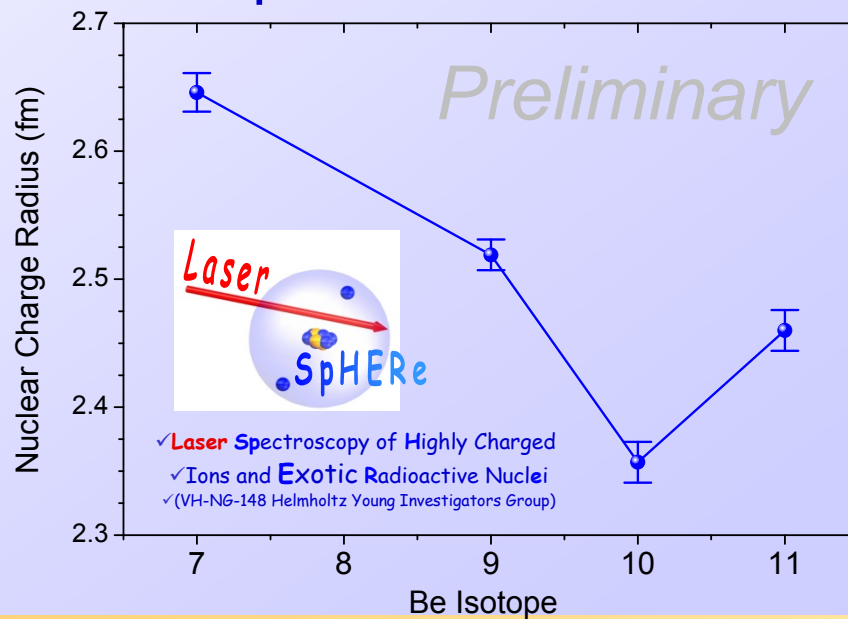
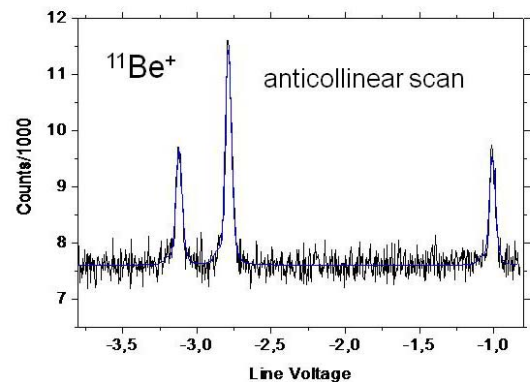
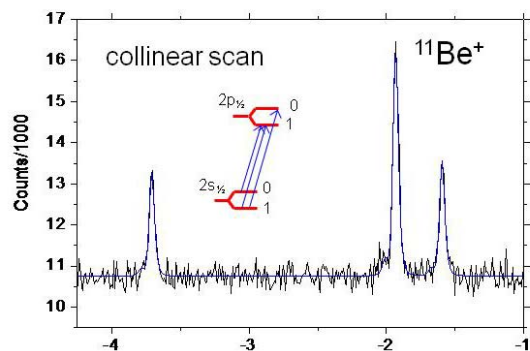
Status of INTC shifts

Status of ISOLDE experiments

Highlights 2008 – IS449

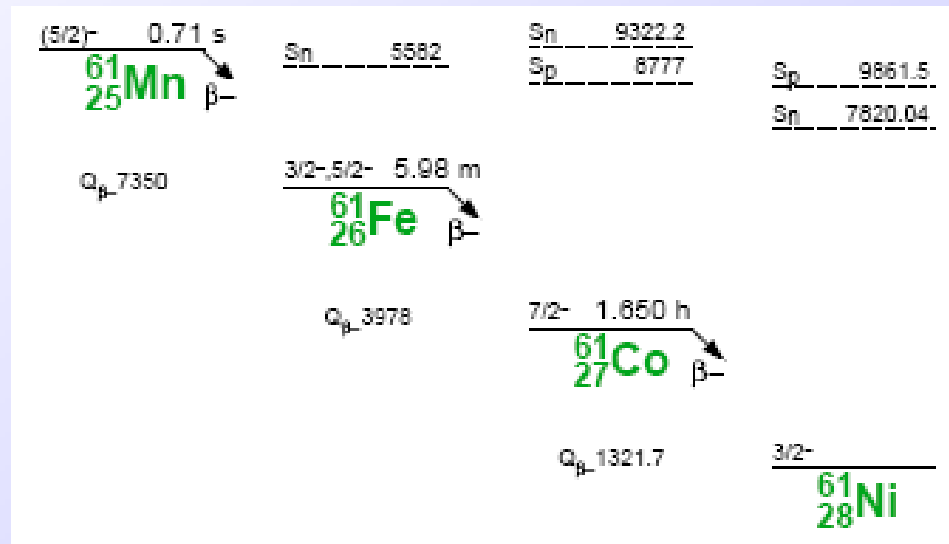
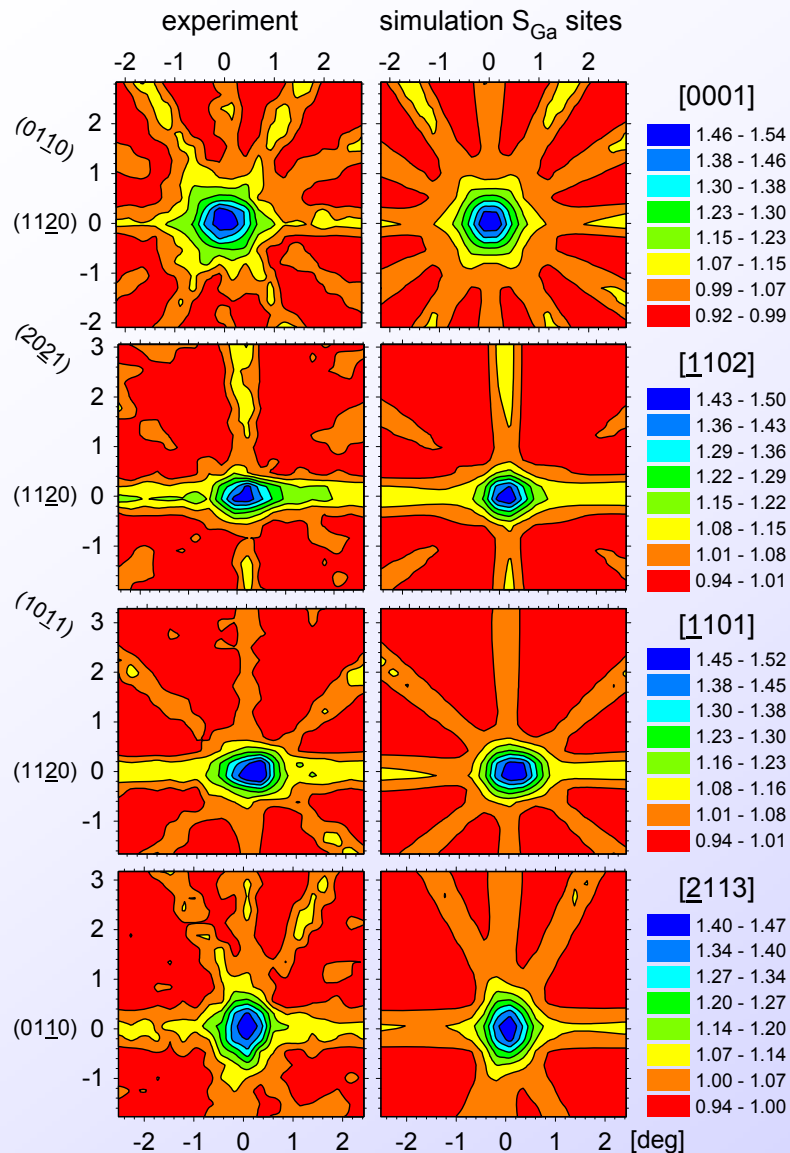


Charge radii of Be isotopes



ECSLI Mn beam time:

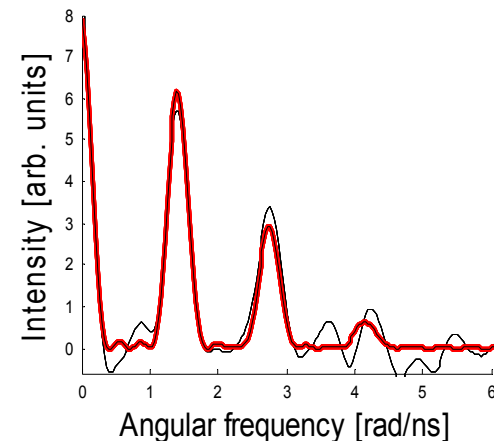
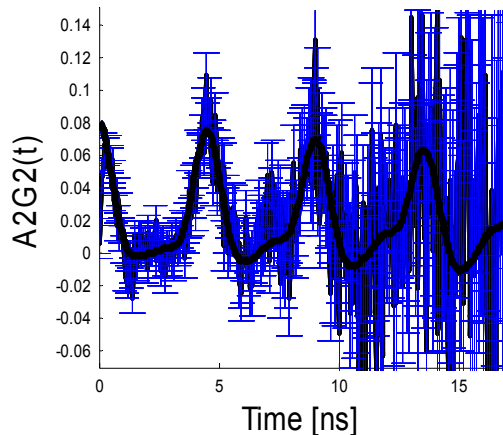
β^- emission channeling patterns
from ^{61}Co in GaN



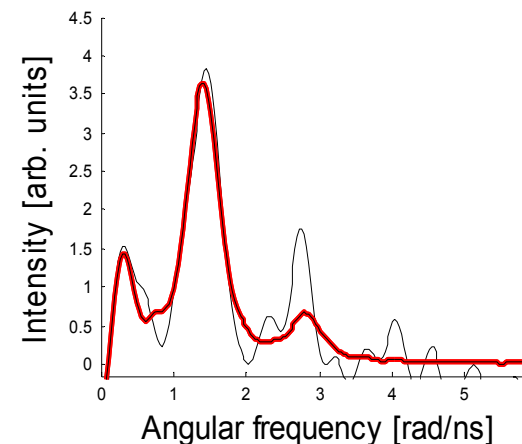
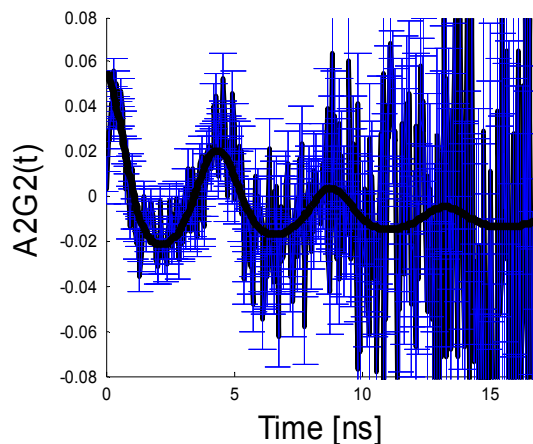
- ^{61}Mn implanted ($\sim 10^{13} \text{ cm}^{-2}$)
- wait 25 min + anneal at 800°C
- emission channeling patterns measured from ^{61}Co β^- particles
- fit results:
 ^{61}Co on substitutional Ga sites

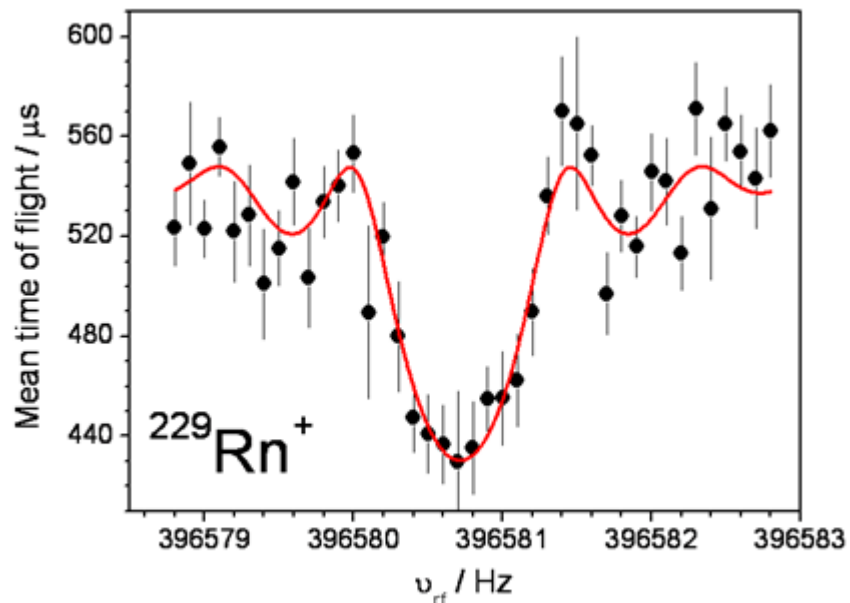
In vivo experiments:

Whole plant with roots (only the collected Hg(II) and water added)



Only leaves (only the collected Hg(II) and water added)



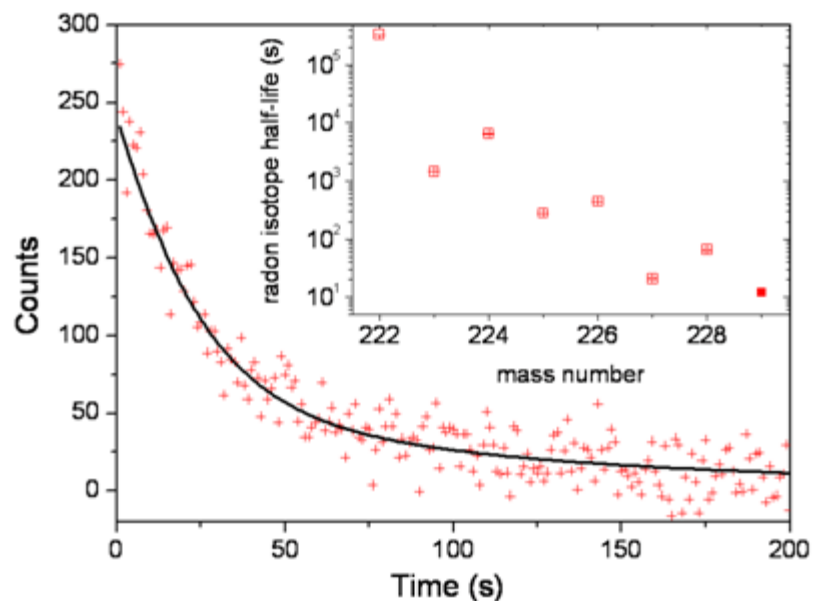


Precision mass measurements
at ISOLTRAP

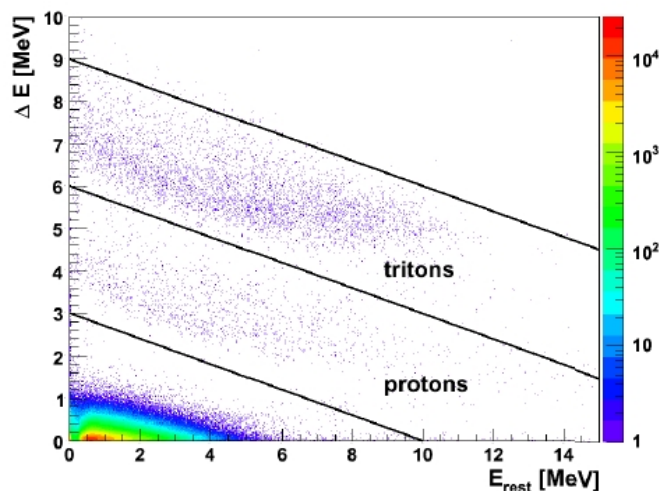
First observation of ^{229}Rn

New ion source with higher
efficiency for noble gases

Measured half-life of ^{229}Rn
at ISOLDE tape station

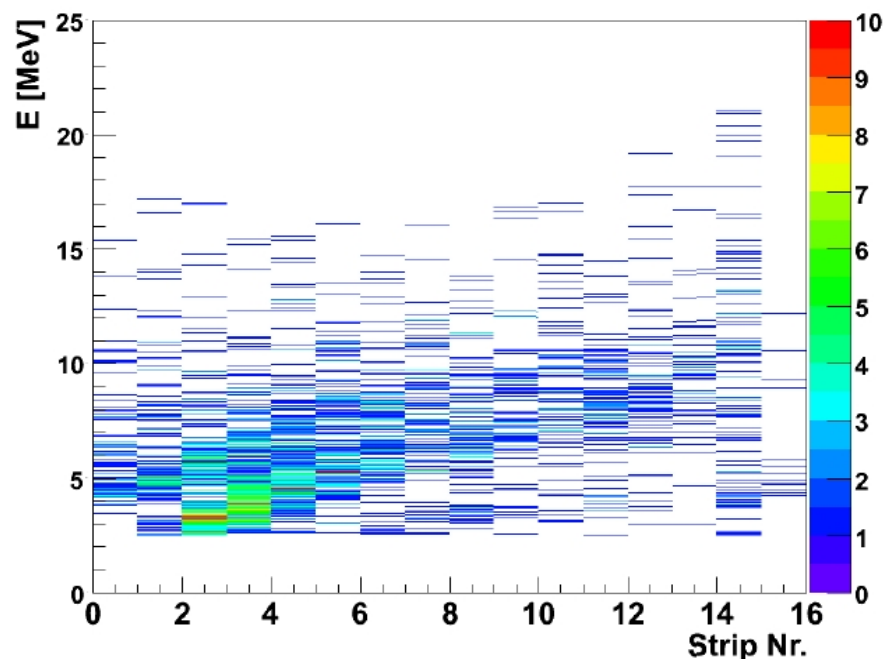


In forward direction cut on protons in $\Delta E - E_{rest}$ spectrum:



- about 2000 protons identified in 150 h of beam time
- elastic scattered protons are stopped in the ΔE detector
- two neutron transfer reactions work!

only protons from reactions



- 3 states visible?
- about 900 counts in each region consistent with our expectation

Running period 2008 ... successful

- **Rough start in the beginning ...**
 - unstable controls
 - limitation of proton beam intensity on GPS
 - vacuum system partly in manual mode
- **... improved during the running period**
 - situation of controls improved ... vacuum still problematic at the end
 - remaining broken diagnostics to be repaired during shutdown
 - no limitation for GPS proton beam intensity
 - new RILIS pump lasers in operation - very good performance
 - good performance of targets - however, yield not in all cases suitable
- **... and as usual some problems**
 - polluted extraction electrode after Pb/Sn targets – problems to reach requested HV
 - no neutron-rich Au or Hg beams (IS447, IS463)
 - several power cuts
 - broken targets (with backup available) – no big loss of shifts
 - consumption of He gas at ISCOOL larger than expected

ISOLDE dates 2008:

2 weeks off-line period
 protons started May 5
 physics started May 9
 protons stop Nov. 12

→ 27 weeks for physics

Scheduled:

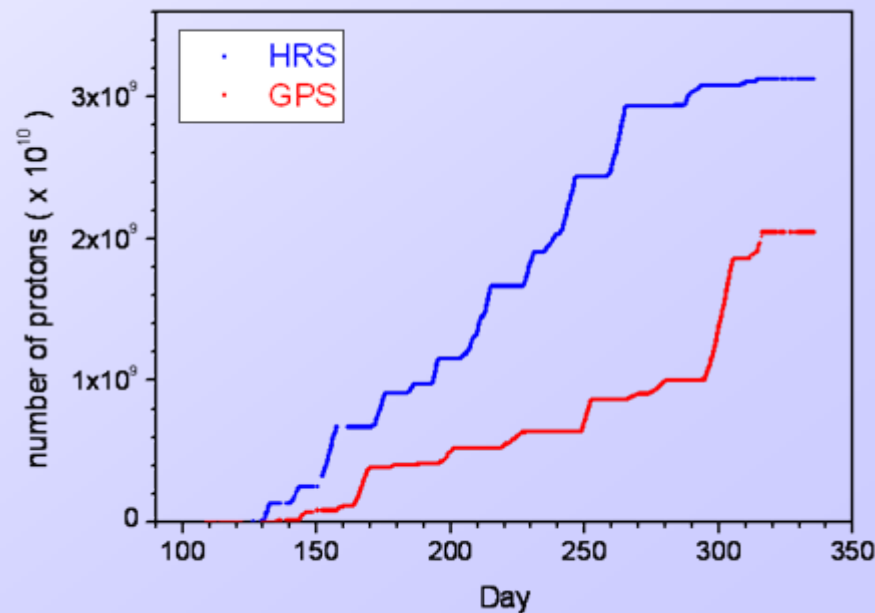
- 31 IS experiments
 (out of 46 requested)
- 25 target units
 (4 old units)
- 14 UC + 1 ThO
 (2 old UC units)

	Apr				May				Jun				
Wk	14	15	16	17	18	19	20	21	22	23	24	25	26
Mo				TISD			IS445					IS449	IS468
Tu								TISD IS393		IS466			
We					IS449			IS413					
Th				TISD					IS473				TISD
Fr						IS445	TISD	IS453 IS450		IS390	IS449		
Sa								IS442	IS466			IS468	
Su										IS442	IS464		

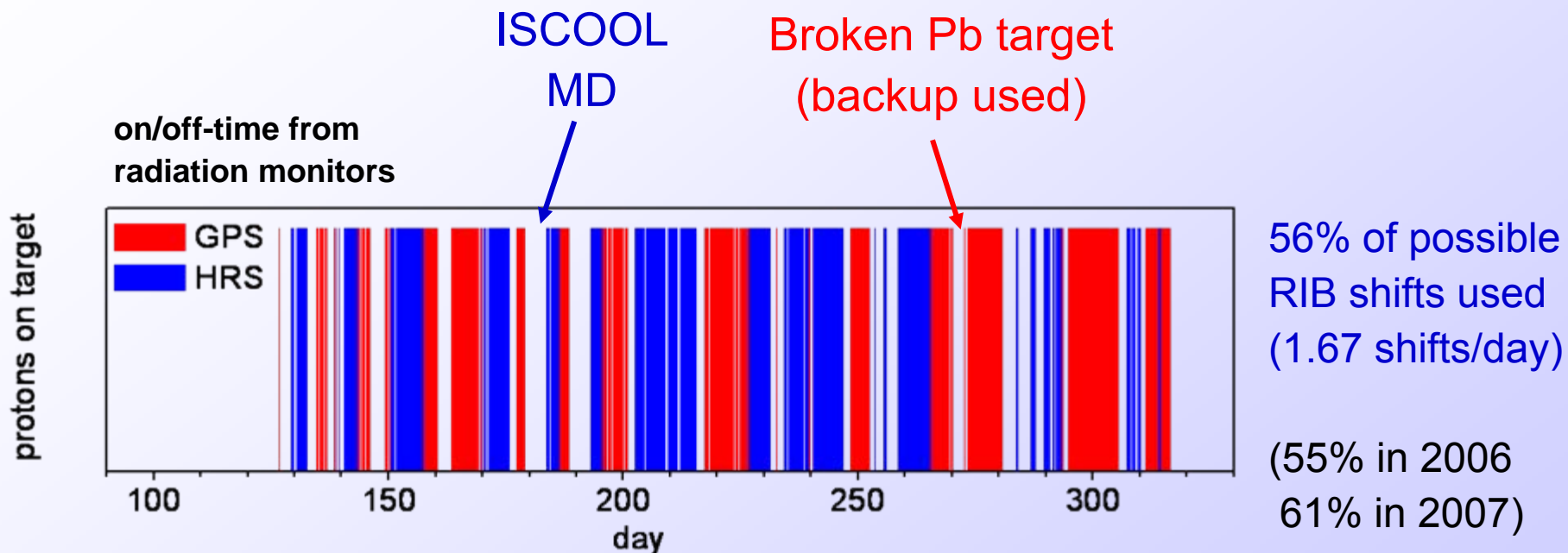
	Jul			Aug				Sep					
Wk	27	28	29	30	31	32	33	34	35	36	37	38	39
Mo			TISD IS447		IS435			IS460	IS461				IS448 IS440 IS472
Tu						IS434	IS458			IS465	coll		
We								IS461					
Th	IS457			IS358								IS418	
Fr			IS473	IS435	IS439	IS458							
Sa		IS398					IS460		IS465	IS443			
Su	IS390							IS461		IS440			coll

	Oct			Nov				Dec					
Wk	40	41	42	43	44	45	46	47	48	49	50	51	52
Mo							IS440						
Tu		IS452				REX MD	coll						
We					IS470								
Th			IS463										
Fr	IS452			IS470					REX MD				
Sa		IS473					IS448						
Su						IS440							

- ISOLDE delivered **318.5 RIB shifts**
 - **247 (77.6%) for INTC experiments**
 - **71.5 (22.4%) other**
 - Standard target check + TISD + REX-MD
 - Coordinators reserve: debugging, recovery, tests
 - **31 research projects (IS experiments)**
 - **Integrated # protons = 5.16E+19**
 - Below 2E+20 radioprotection average limit
 - No limitation of GPS proton beam intensity after further tests
- **Running for 191 days**
 - Additional ISCOOL setup time for each HRS target

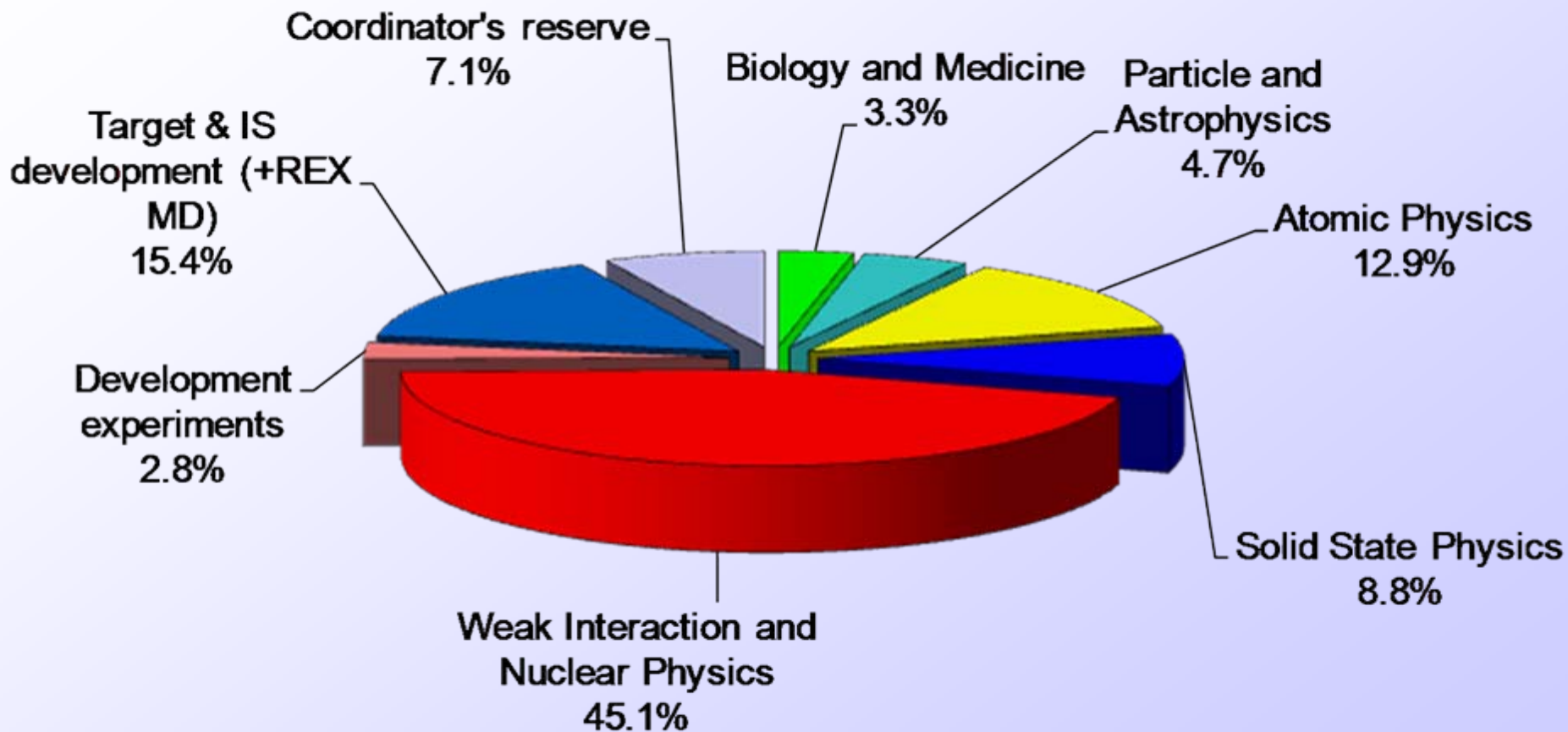


RIB overview GPS/HRS 2008

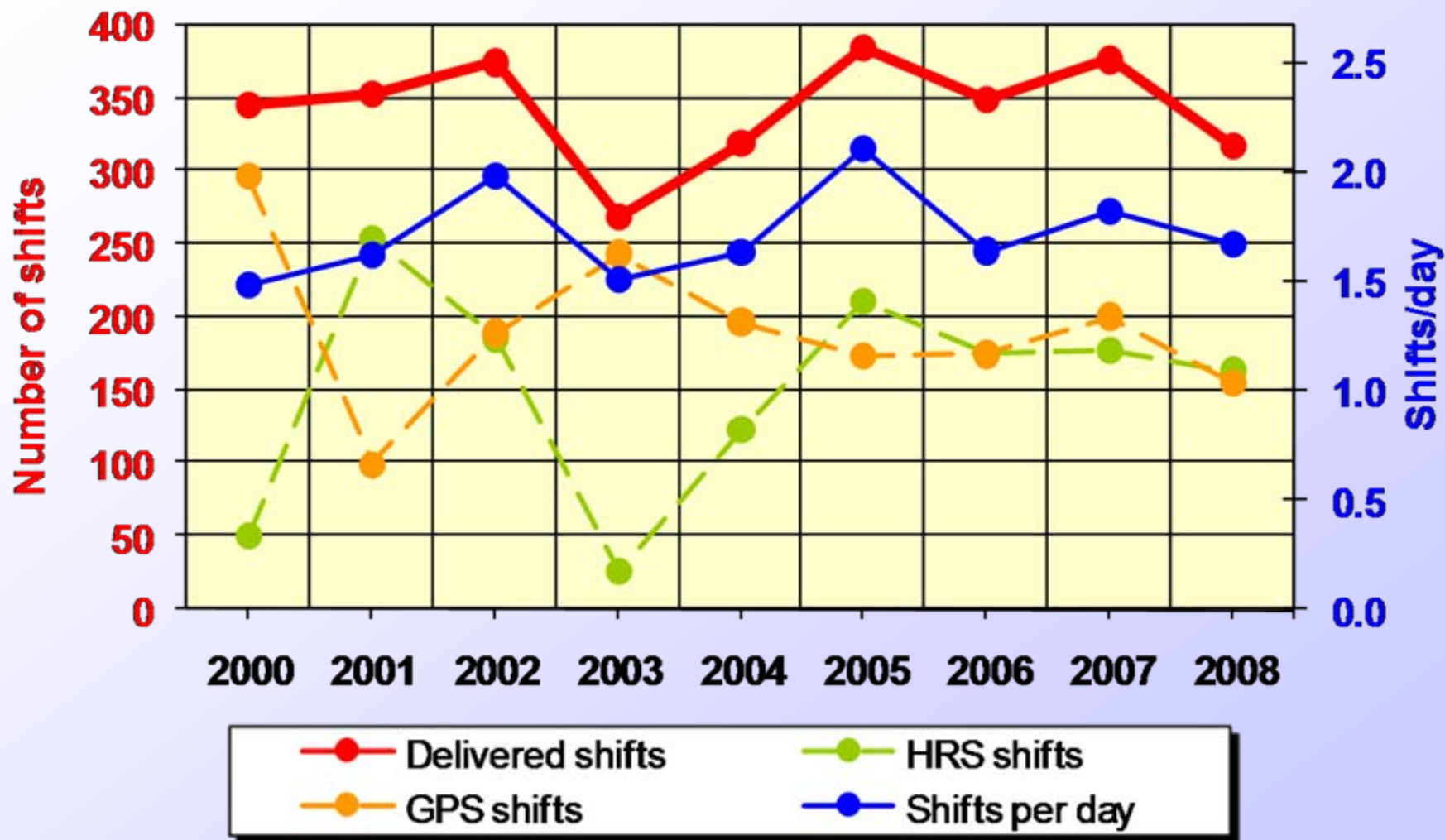


191 days of operation

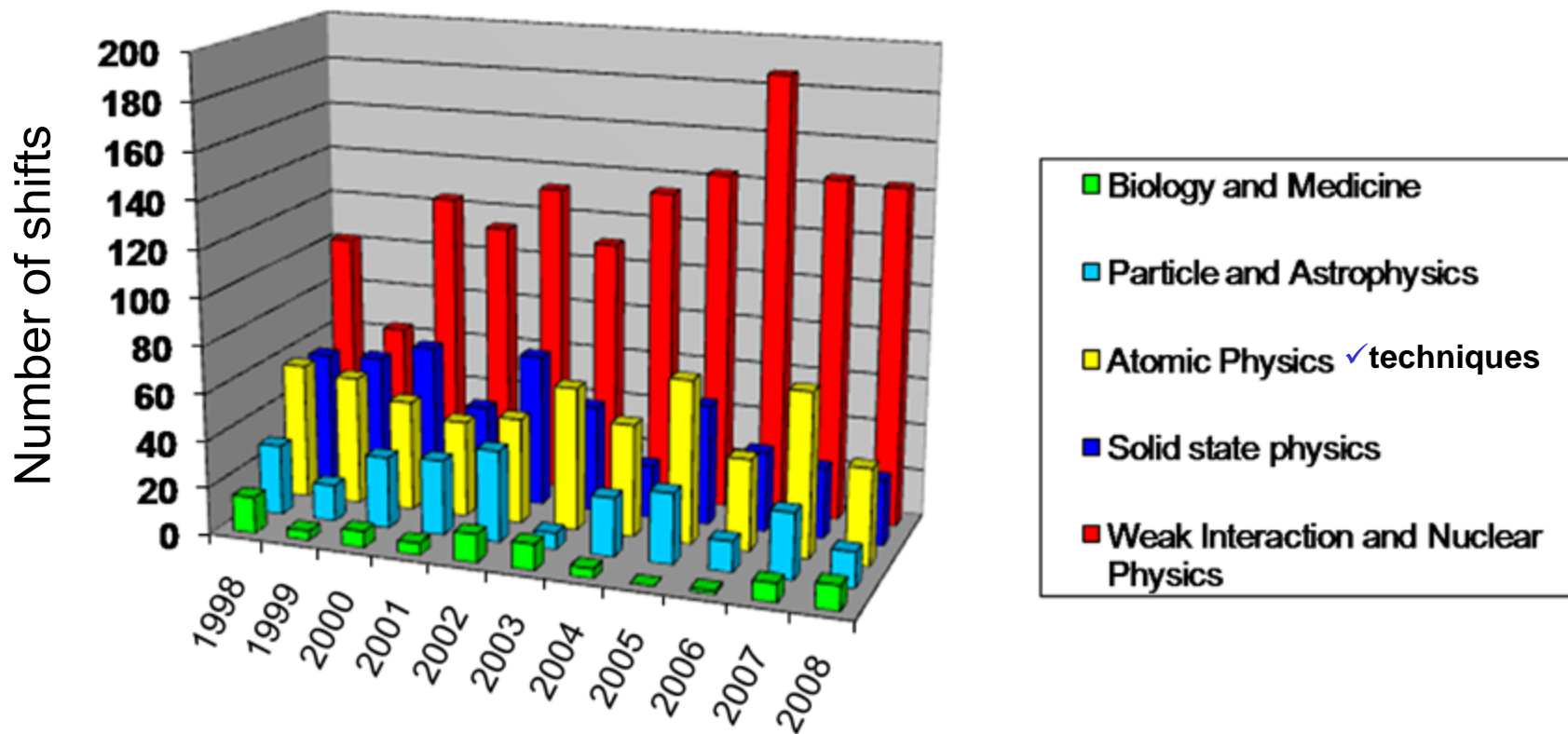
ISOLDE shift distribution 2008



ISOLDE shift distribution 2000-2008



Shift distribution 1998-2008

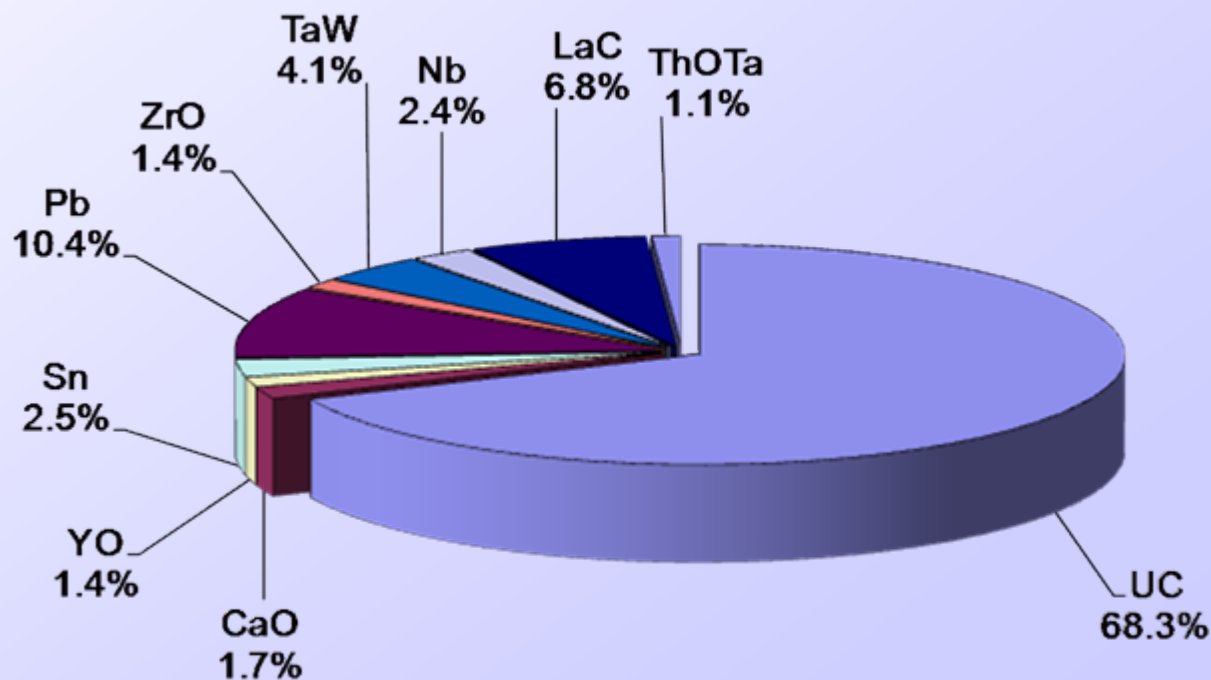


Key resources: targets

- Actinide targets (U+Th)
 - 221 shifts (out of 318.5) [69%]
 - 13 new units (12 UC + 1 ThO) + 2 old UC

- In total 25 targets
 - 21 new units

ISOLDE Target distribution 2008

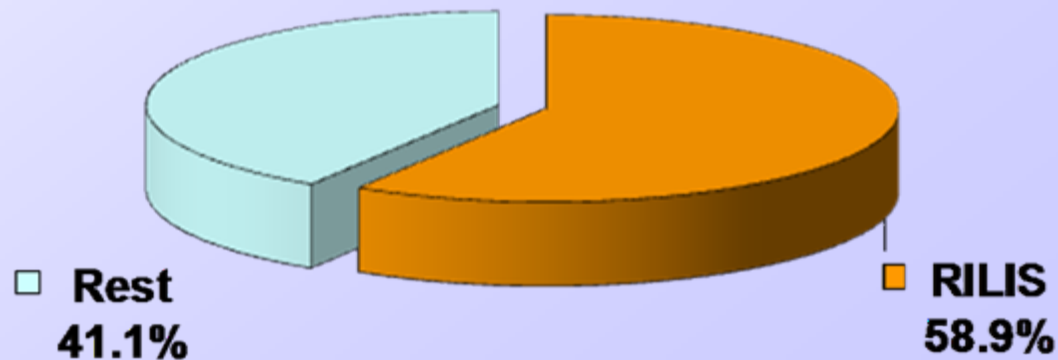


Key resources: RILIS

- 150.5 total RIB shifts
 - 145.5 shifts for INTC experiments
- 1836 hours for online work
 - includes setup, yield checks, etc.
 - 2013 hours total running time (incl. off-line tests)
- 20 IS experiments

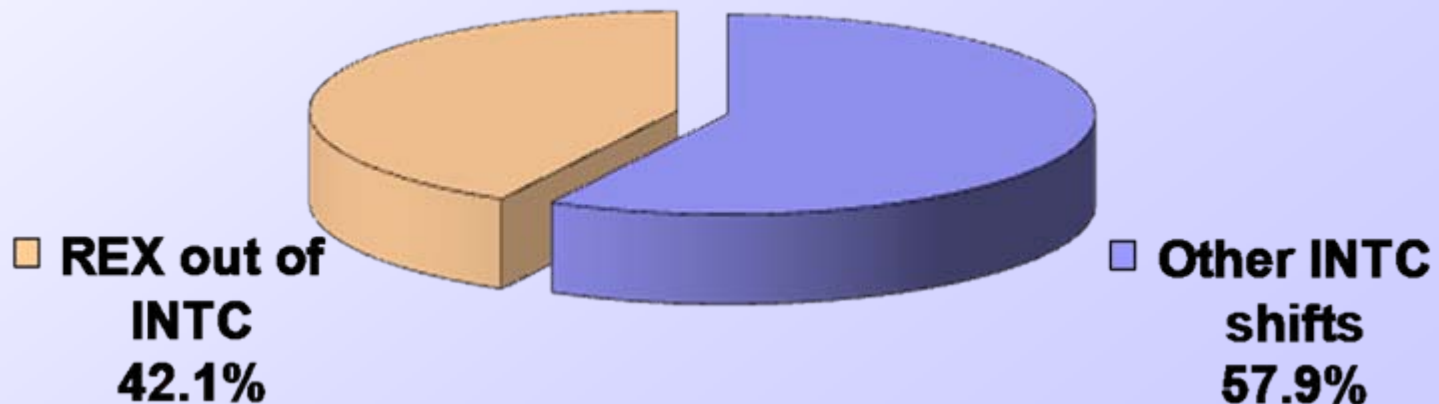
- Beams: Nd, Ga, Be,
Cd, Tl, Mn,
Au, Cu, Mg, Pb

RILIS % from INTC shifts 2008

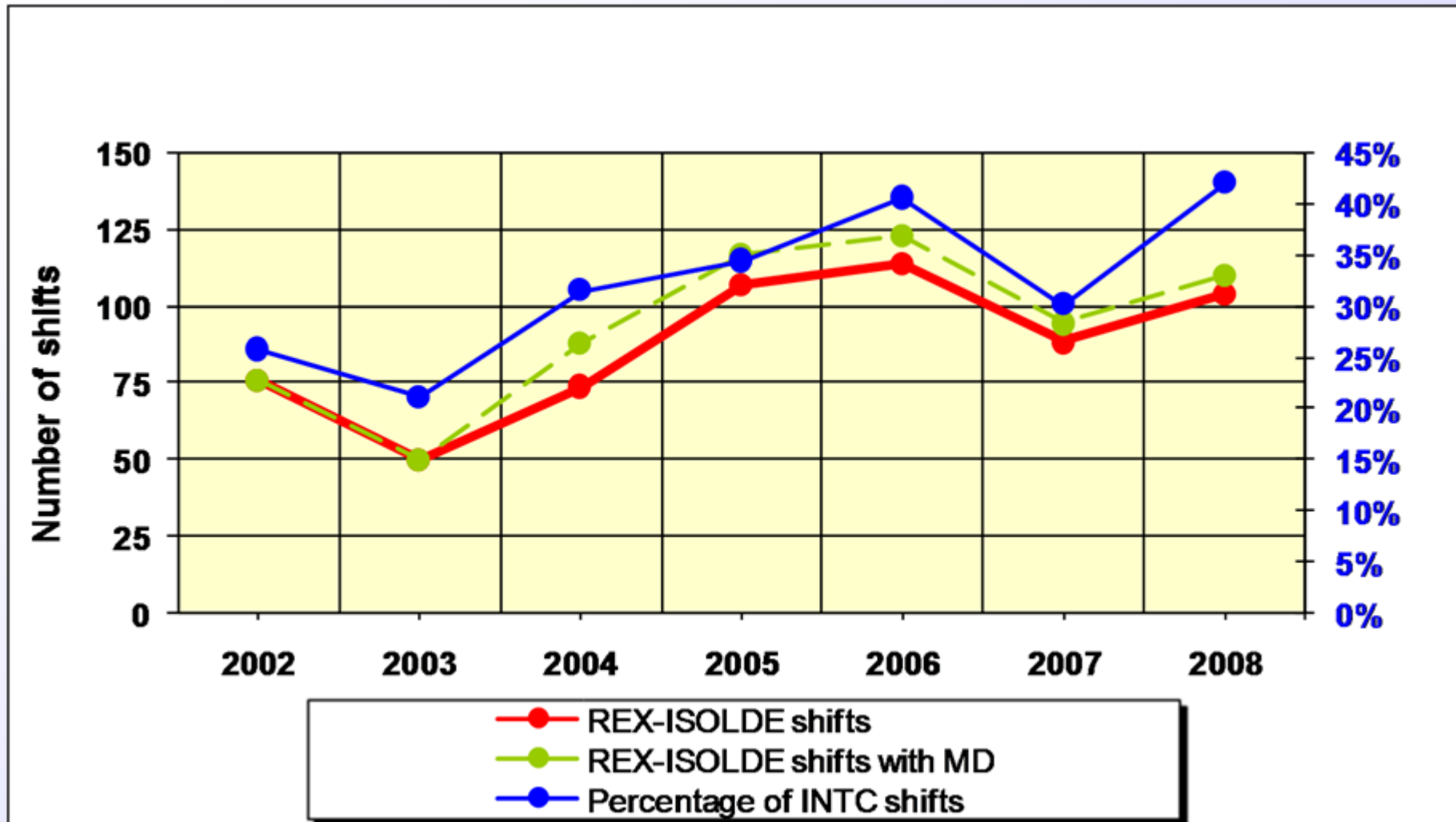


- 104 RIB shifts delivered to experiments
 - + 6 RIB shifts for development
 - 7 experiments
 - pulsed injection from ISCOOL
 - investigation of mass resolution technique
- new REX radioactive beams for physics in 2008
 - $^{10}\text{C}^{3+}$, $^{61}\text{Fe}^{21+}$, $^{61,62}\text{Mn}^{15+,21+}$, $^{202,204}\text{Rn}^{47+}$

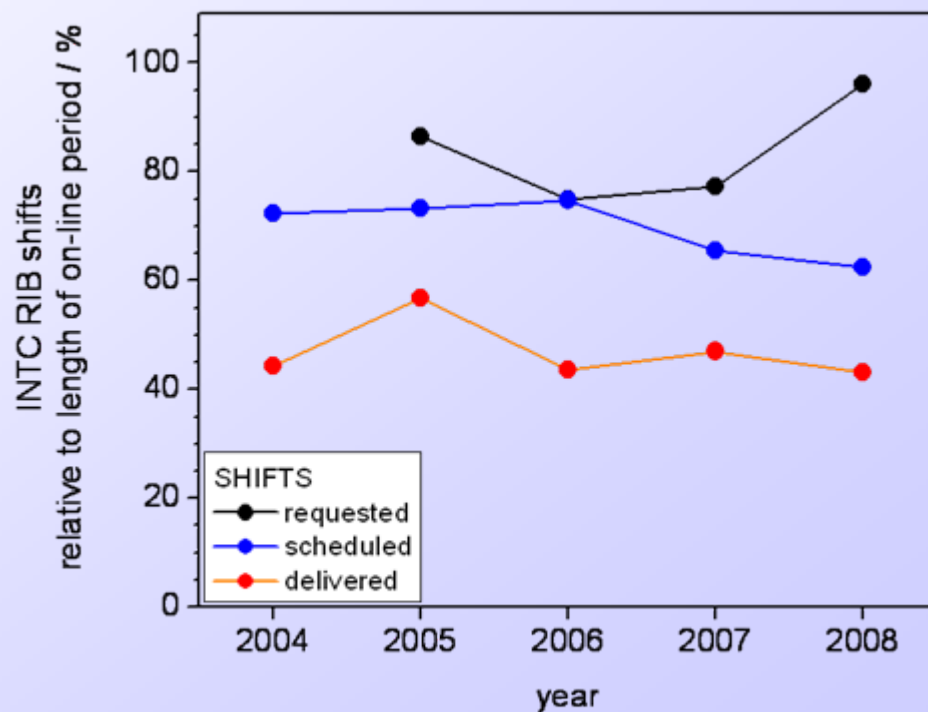
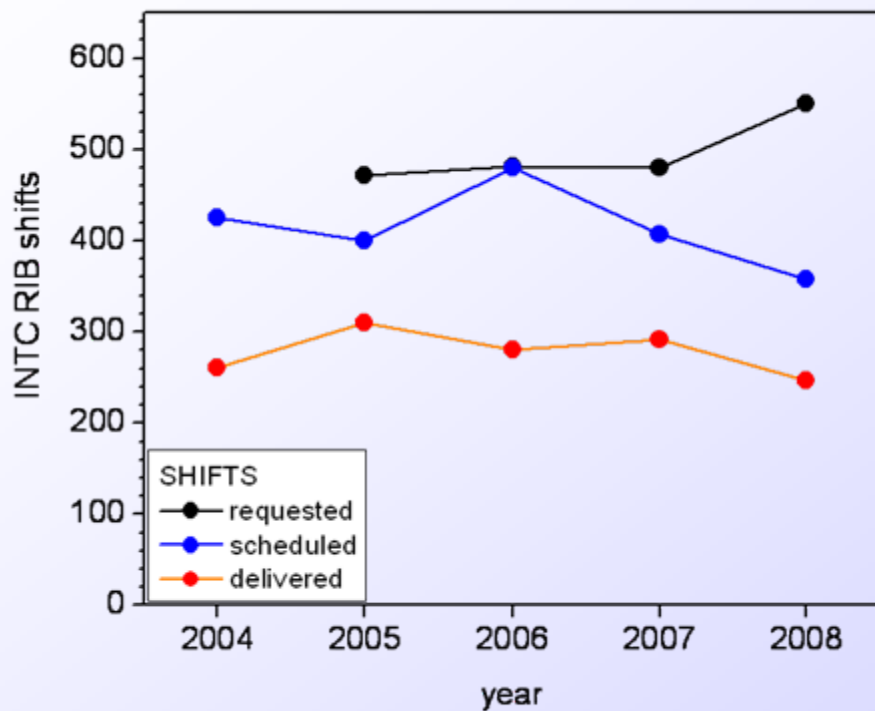
REX % from *INTC* shifts 2008



REX-ISOLDE 2002-2008



Evolution of INTC shifts



New ISOLDE experiments in 2008

- **IS465 - IS483** (19 new experiments, 6 scheduled in 2008)

Closed ISOLDE experiments

- **IS360, IS386, IS412, IS421, IS428**
- **IS406** (closed by INTC)
- **IS436** (MISTRAL - experimental setup **to be removed**)
- more inactive experiments to be checked at May meeting

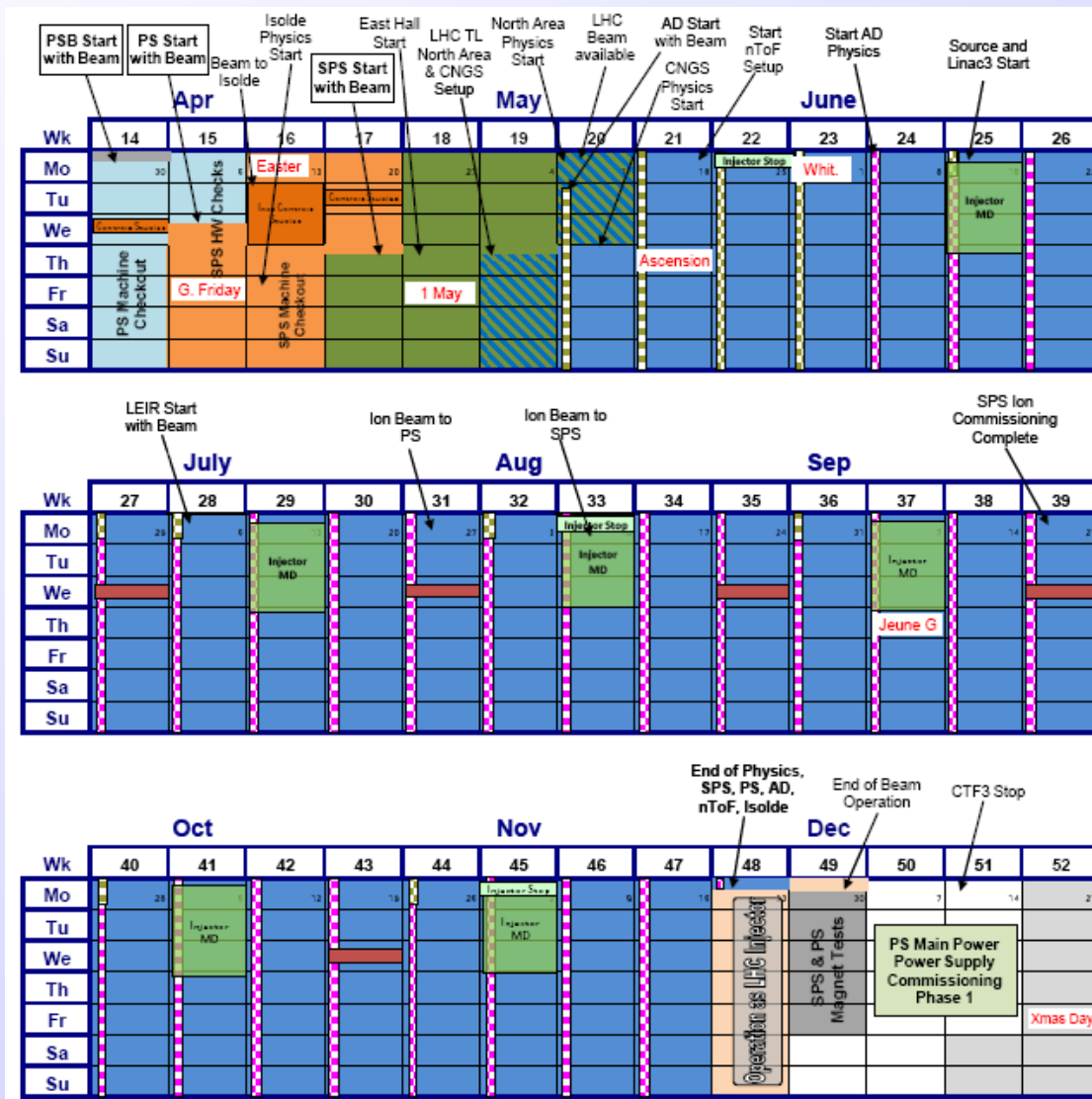
Accelerator schedule 2009

Version 3.2

as approved by Research Board
(December 5, 2008)

ISOLDE dates:

protons from PSB **April 14**
 physics start ISOLDE **April 20**
 protons stop **November 23**
 (i.e. **31 weeks** for physics
 as compared to 27 weeks
 in 2008 = **84 shifts more**)



Status of INTC shifts

- Active experiments 2007
 - 63 with 470 shifts in total
- INTC meeting February 2008 + Beam requests
 - 5 experiments closed
 - 9 new experiments and additional shifts for existing experiments
 - 67 active experiments with about 700 shifts
- INTC meeting May and November 2008
 - Additional 300 shifts – in total 531 new shifts in 2008
- RIB delivered in 2008
 - 247 shifts

... Beam requests 2009?

Follow up: Reallocation of floor space for experiments

- CRIS setup
 - Beam line racks installed
- MISTRAL
 - First clean-up planned for February/March
- ASPIC
 - Discussion on future ongoing
- ECR charge breeder
 - Discussion on future ongoing (most likely to be removed)
- β -NMR system
 - Installation in extension discussed
 - Control system is being updated (LabVIEW)