



Physics coordinator report

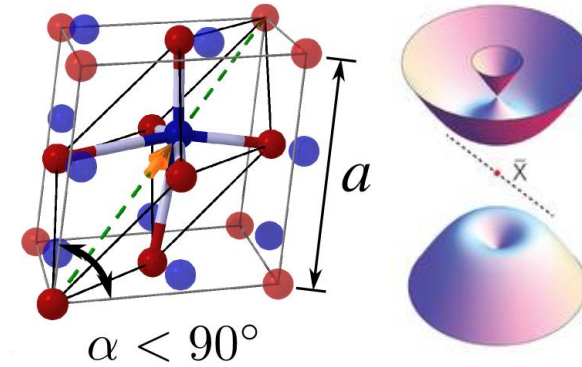
Karl Johnston

52nd INTC: Bumper Session!

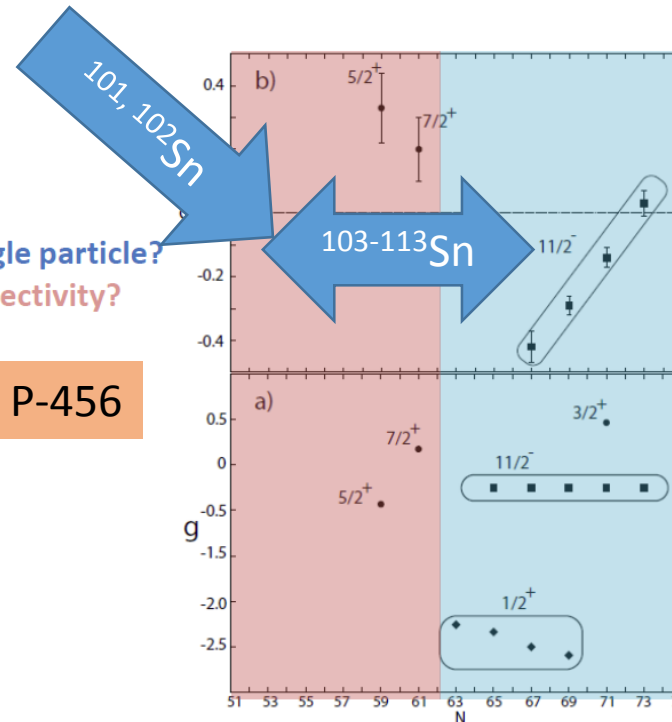
16 proposals/addenda received
3 letters of intent

Variety: nuclear structure, astrophysics, hyperfine interactions to topological insulators, medicine and chemical properties of At.

P-455



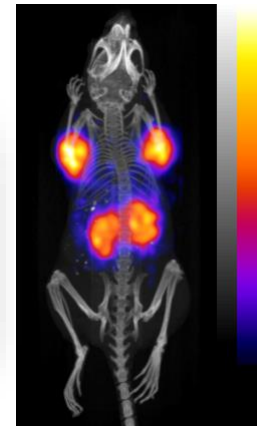
ferroelectric
Rashba
semiconductor
(FERS)



P-456

P-312-ADD-2

Tb 152
17.5 h
 ϵ
 β^+ 2.8...
 γ 344;
586;
271...

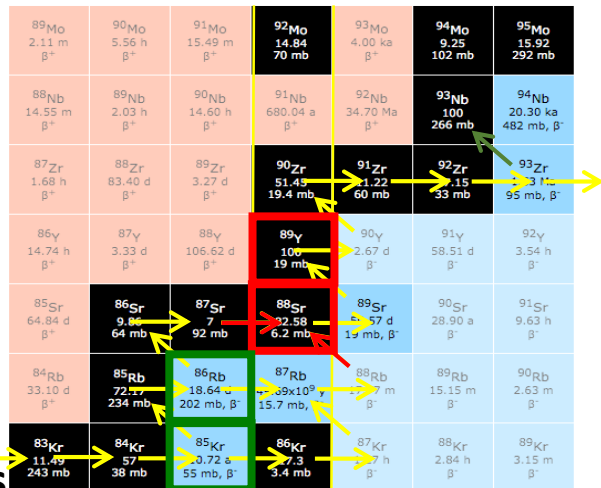


P-462

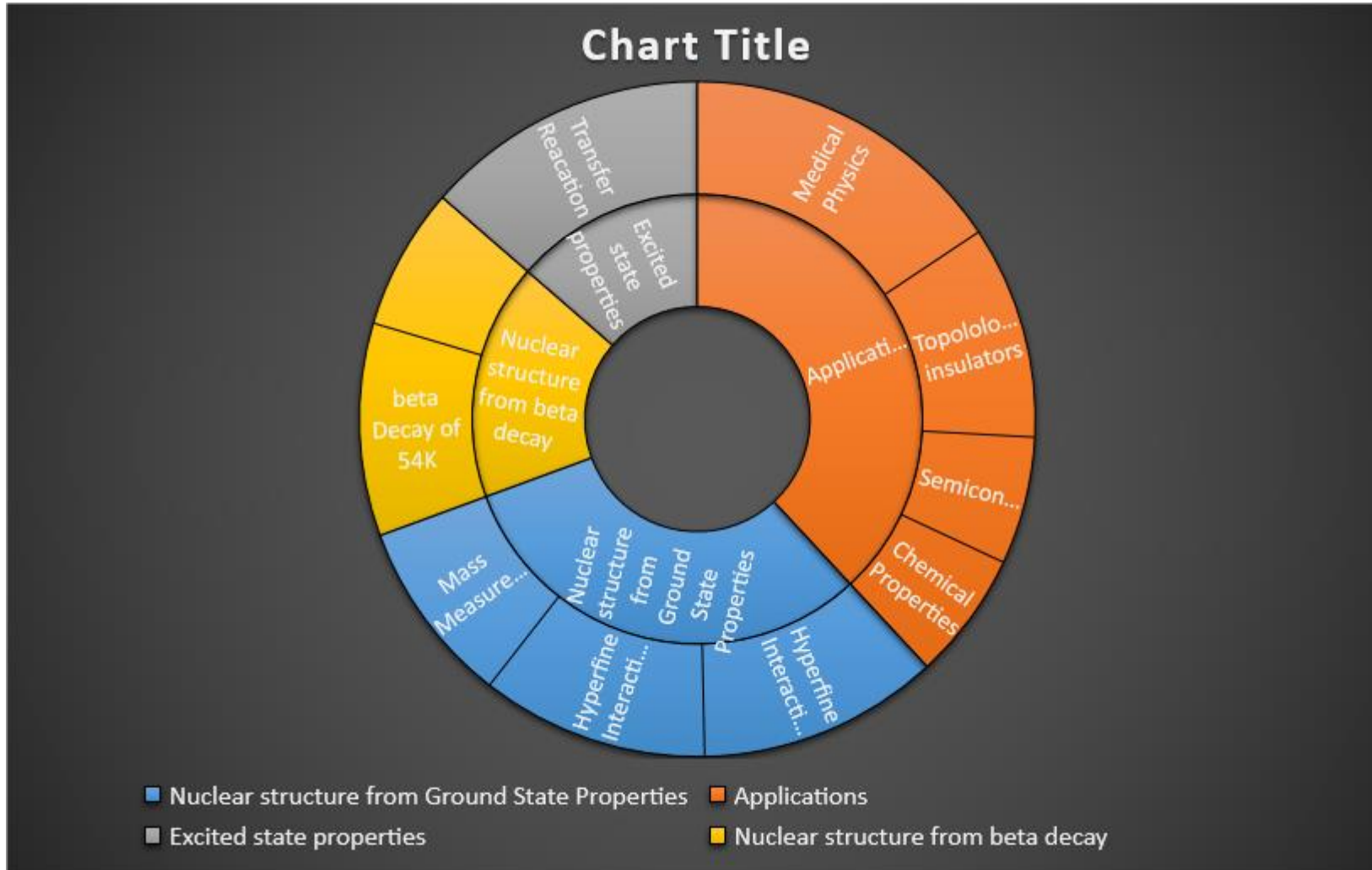
ASTATINE 70mg
1 x per Planet (Apply to crust) ²¹⁸At

P-453

s-process
path



Outcome



- 8 proposals fully supported
- 6 partially supported (reduction in recommended number of shifts)
- 1 letter of clarification requested
- 4 proposals rejected or asked to re-submit
- 147 extra shifts for ISOLDE

- 3 nTof proposals/LOI: 4.5×10^{18} protons

1. INTC-P-452: 0 out of 9 shifts recommended
2. INTC-P-454: 9 out of 9 shifts recommended
3. INTC-P-455: 15 out of 15 shifts recommended
4. INTC-P-456: 17 out of 35 shifts recommended
5. INTC-P-457: 0 out of 46 shifts recommended
6. INTC-P-458: 0 out of 11 shifts recommended
7. INTC-P-312-Add-2: 23 out of 33 shifts recommended
8. INTC-P-459: 10 out of 10 shifts recommended

9. INTC-P-317-Add-3: 13 out of 13 shifts recommended
10. INTC-P-425-Add-1: 15 out of 22 shifts recommended
11. INTC-P-460: 0 out of 15 shifts recommended
12. INTC-P-461: 0 out of 21 shifts recommended
13. INTC-P-462: 9 out of 16 shifts recommended
14. INTC-P-463: 20 out of 29 shifts recommended
15. INTC-P-464: 16 out of 21 shifts recommended
16. INTC-I-166: support recommended (0 shifts)

In total 147 out of 305 recommended.

INTC 53

- 18 documents received
- 11 proposals
- 4 LOIS
- 1 letter of clarification
 - 2 addenda
 - 2nTof
 - 2 for ISS
- Open session tomorrow morning from 11:00 in the council chamber...including special summary of the 7Be collaboration between ISOLDE and nTof

Overview of planned experiments (HIE ISOLDE apart)



COLLAPS

- In-source laser spectroscopy on Bi – this week (RILIS + WINDMILL + ISOLTRAP)
- First run of year: Cr
- Cd, Mg upcoming (PI-ICR)
- IDS: decay of N, In, Mn, Ba
- He (VANDLE)
- Hg
- SSP/biophysics/
 - Mn and In for EC/Mossbauer
 - Cd, & Hg for PAC
 - Mg for EC
 - Rare earths for SSP
- CRIS: Cu, Ra
- N-rich Ni, Sn, Al
- Tb isotopes and rare earths for medicine
- Negative At ions
- ^7Be for nTof

Difficult “cold check-out”

Unable to heat GPS line, couple targets.

Since week 15, things have improved.

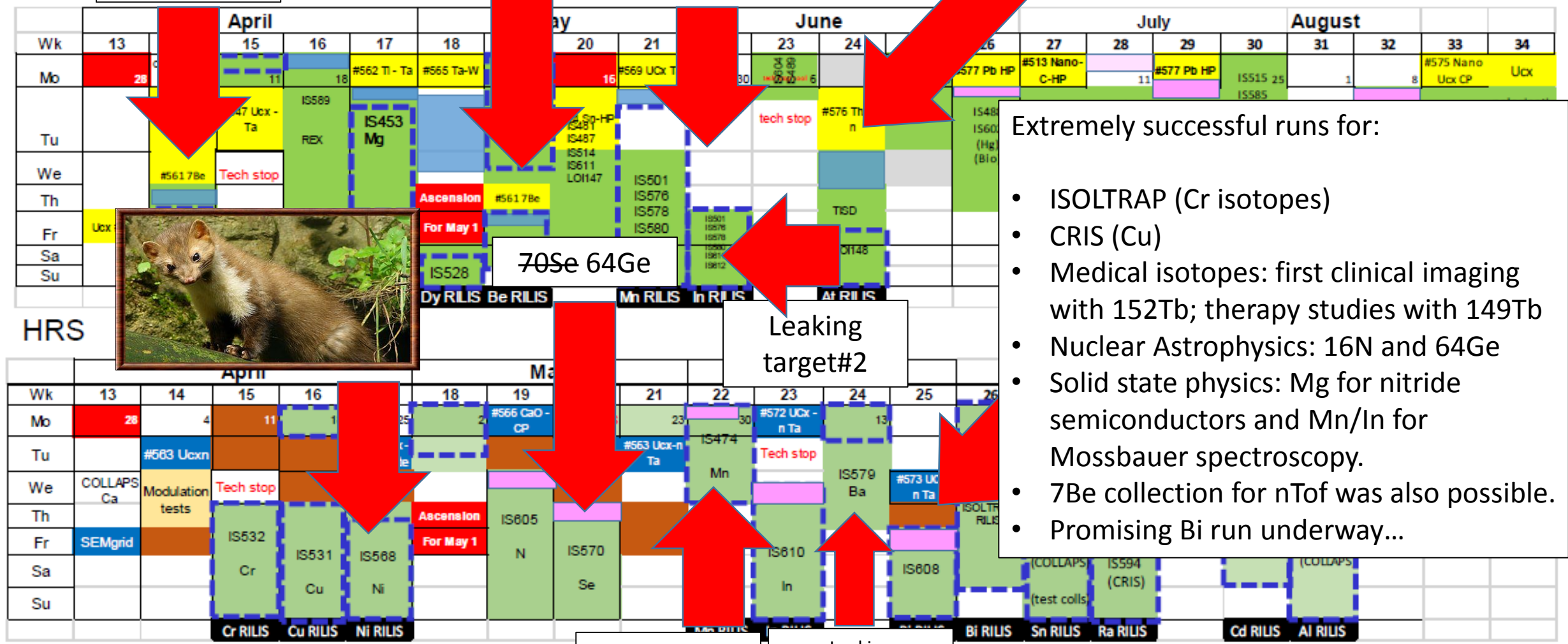
35 experiments scheduled till early August
264 shifts

Problems on GPS: unable to heat line..

Rescheduled 7Be

Switch to GPS:Mn

Negative run: rebuilt ion source (LaB6) Th/Ta foils...fast turnaround...



- Extremely successful runs for:
- ISOLTRAP (Cr isotopes)
 - CRIS (Cu)
 - Medical isotopes: first clinical imaging with 152Tb; therapy studies with 149Tb
 - Nuclear Astrophysics: 16N and 64Ge
 - Solid state physics: Mg for nitride semiconductors and Mn/In for Mossbauer spectroscopy.
 - 7Be collection for nTof was also possible.
 - Promising Bi run underway...

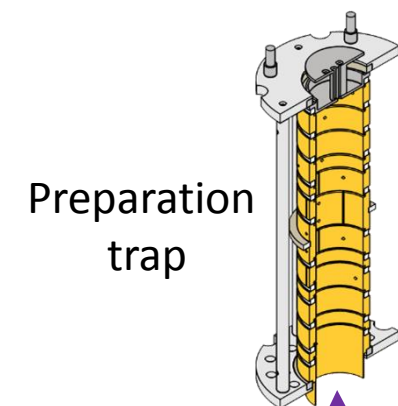
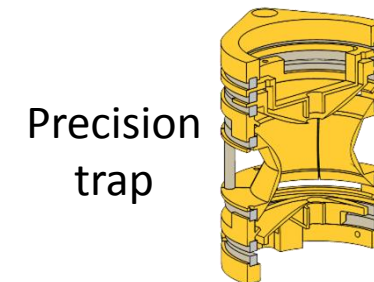
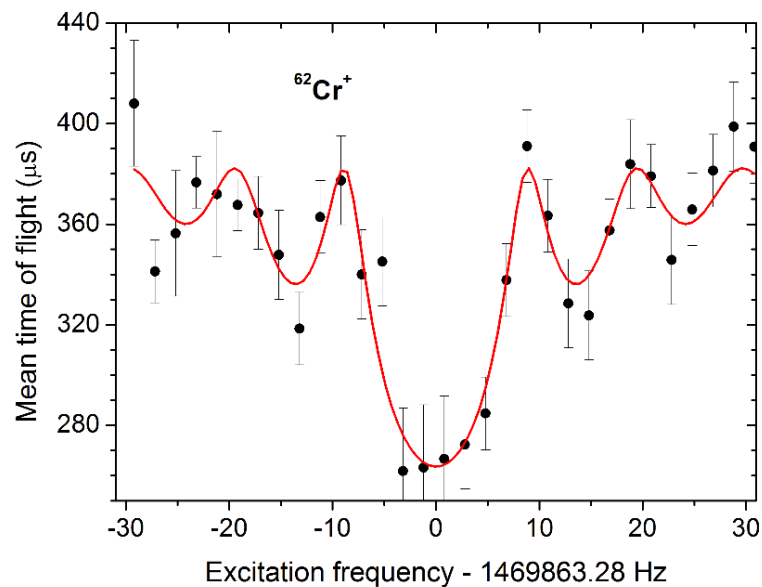
70Se 64Ge

Leaking target#2

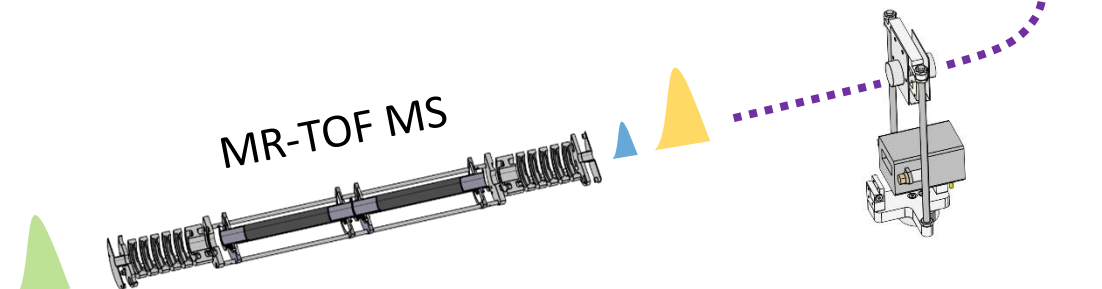
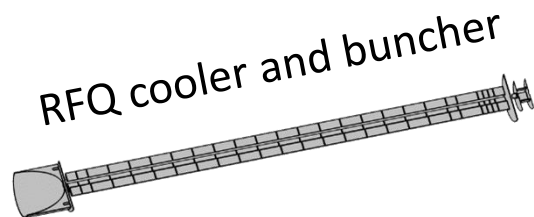
Leaking target#1

Leaking target#3...pattern emerging....neutron conv and after p+ on target

- Intense n-rich chromium beams up to mass 63 were studied for the first time at ISOLDE with the Penning-trap mass spectrometer ISOLTRAP.

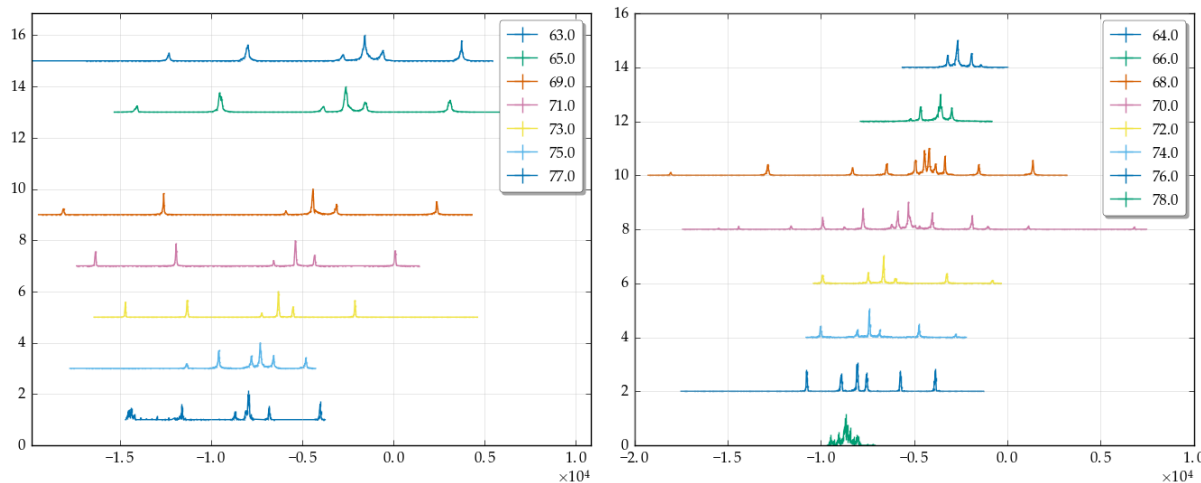
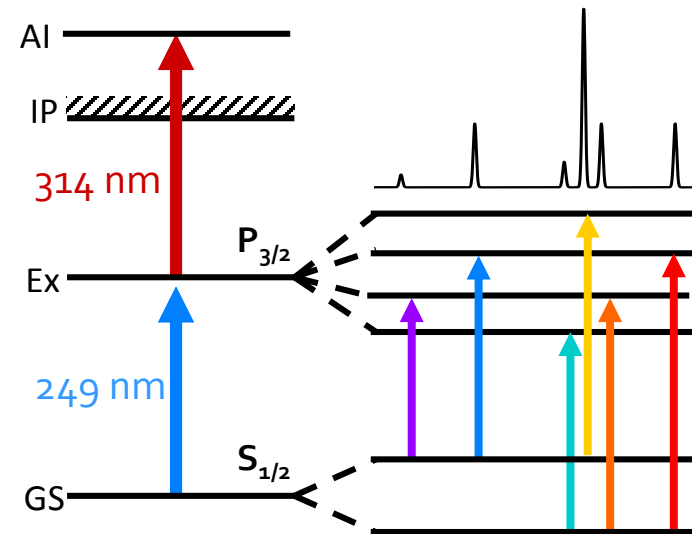


Mini shutdown from April – June
for PI ICR...now being tested with
Bi...

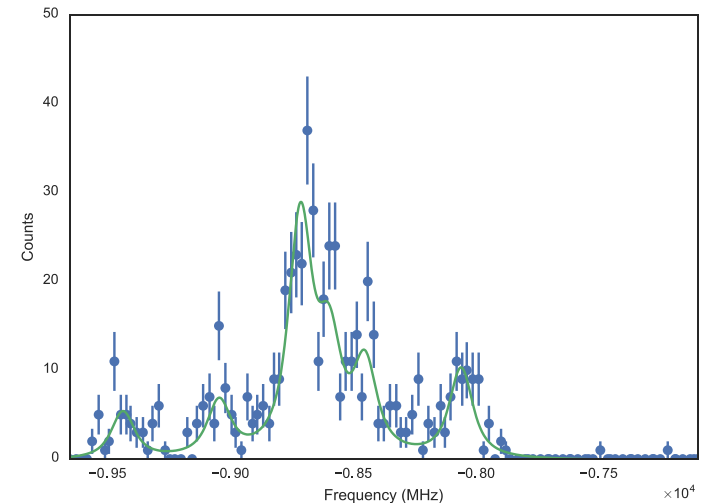


The CRIS experiment: 2016 so far

- High resolution collinear resonance ionization spectroscopy of neutron-rich copper isotopes
 - Study evolution of the shell model with neutron excess
- **Aim:** Study spins, magnetic and quadrupole moment of $^{76-78}\text{Cu}$
- **Outcome:** Studied HFS of **15** isotopes $^{63-66,68-78}\text{Cu}$
- First RIS scheme to an auto-ionizing state for CRIS
 - **249.2 nm** tripled light from injection-seeded TiSa cavity locked to M2 Ti:Sa laser and **314.2 nm** doubled light from PDL laser pumped by Litron laser



^{78}Cu : < 20 ions/s



IS568: Laser spectroscopy of Ni at COLLAPS

Aim: Study sub-shell effects at N=40...

→ Is there an upward kink in the charge radius? Effect on the moments?

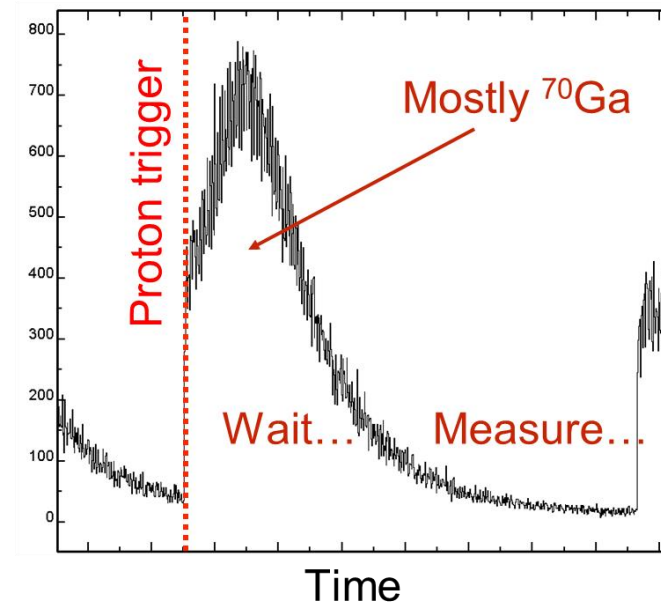
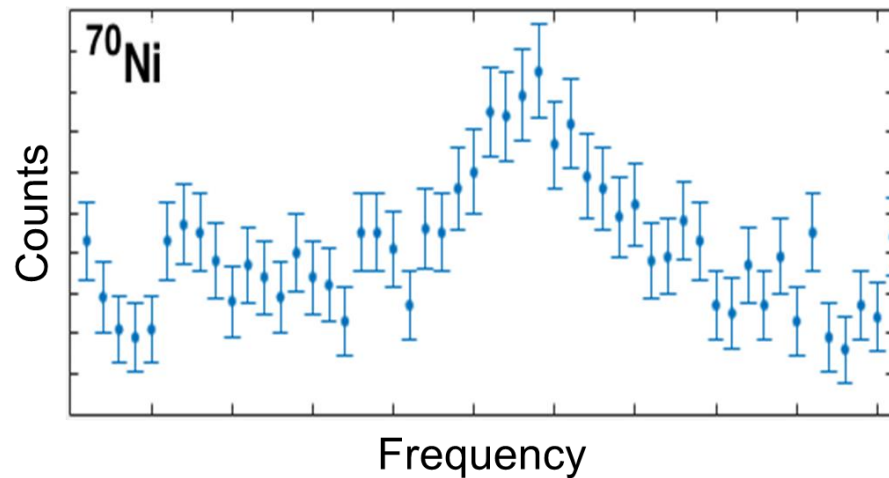


Low target yields from experimental unit → decided against converter

✗ Could not measure $^{69,71}\text{Ni}$ — crucial for studying moments past N=40

✓ Could measure ^{70}Ni — (since only a single peak) will give charge radius

Had to gate out ^{70}Ga contamination



Mössbauer collaboration at ISOLDE/CERN



- Six experiments:

- IS501: Oxides and silicon
- IS576: (Al, Ga)N:Mn
- IS578: Mn based alloys
- IS611: MoO_x and 2D materials
- IS612: Topological insulators
- I161: New isotopes



- Beam time 2016:

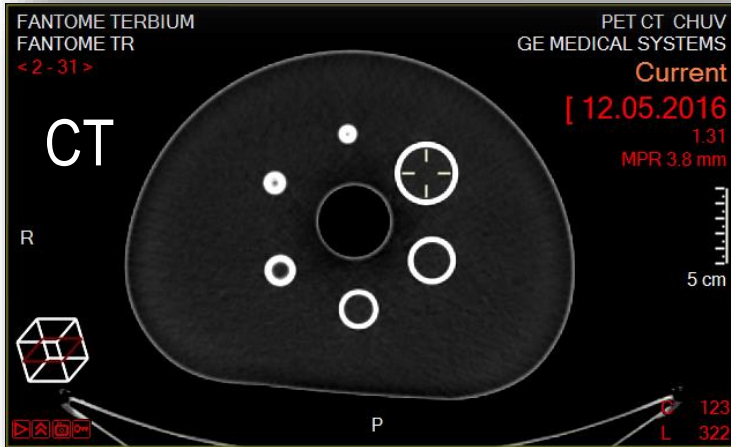
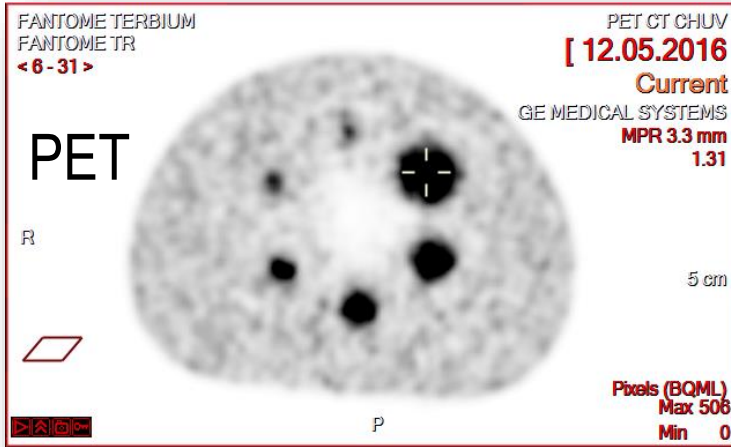
- Extremely successful ⁵⁷Mn & ¹¹⁹In on-line runs, **> 65 individual** experiments

- Some highlights:

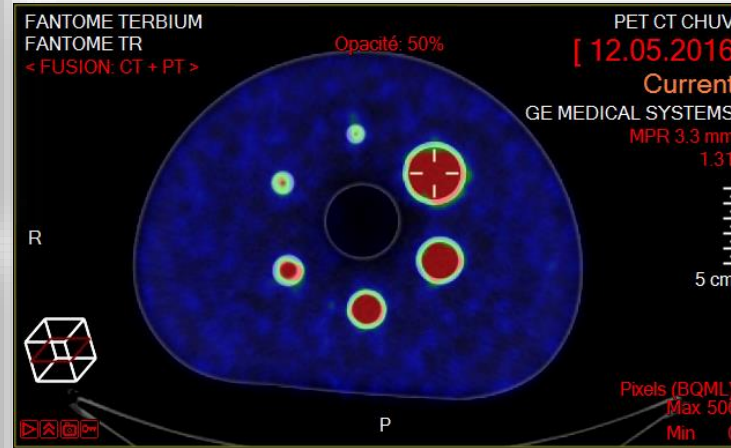
- Sn site symmetry in topological semiconductors
- Nature of Fe sites in silicon at low T's
- Charge state of Fe in Mn doped nitrides
- Implantation physics in manganese alloys
- Crystallization in MoO_x
- ...

First Clinical Phantom Study

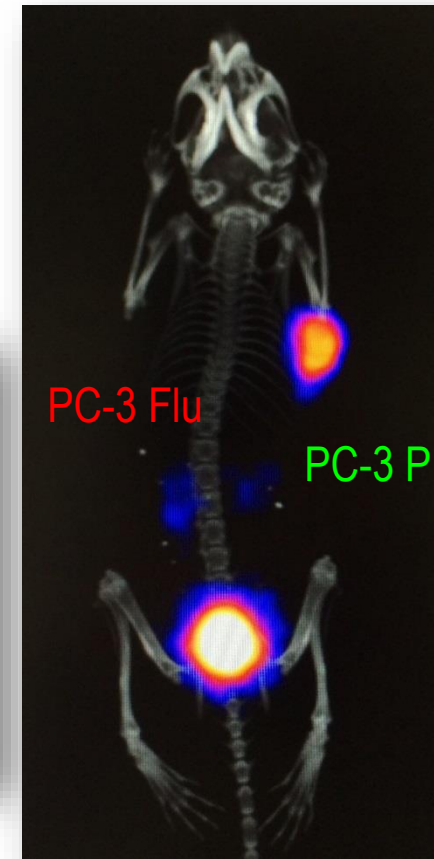
^{152}Tb -Phantom Study performed at CHUV, Lausanne – Images kindly provided by Prof. Dr. John Prior



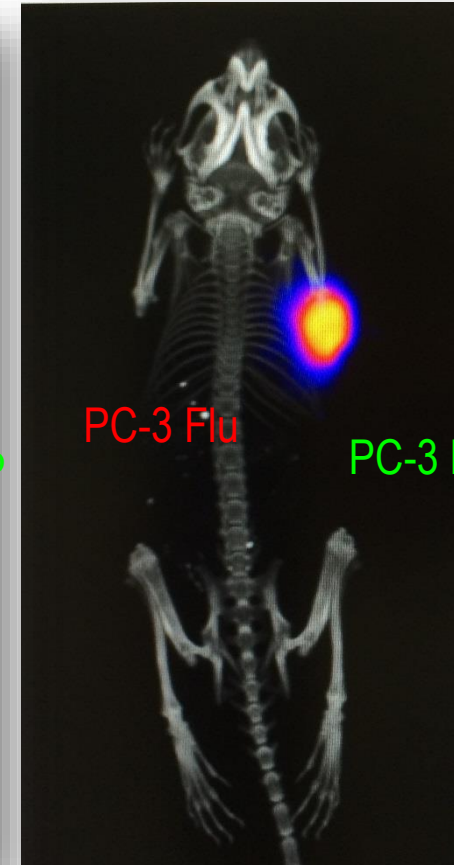
PET/CT



^{152}Tb -PSMA617 – First images obtained at PSI



15 min p.i.



24 h p.i.

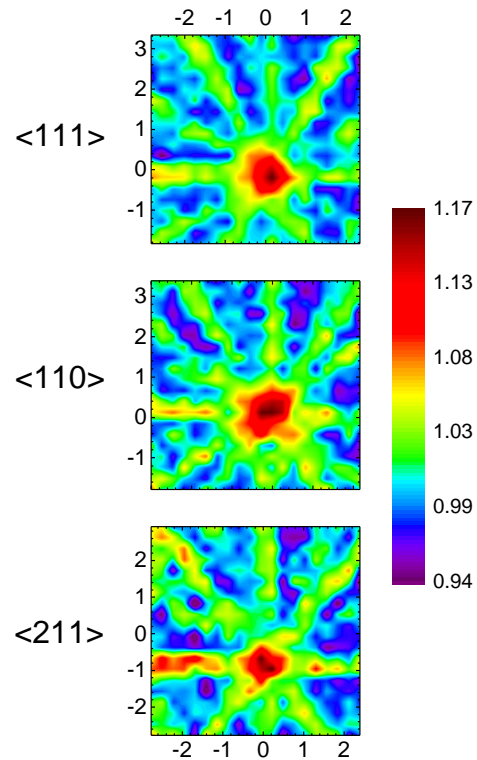
50-60 MBq of a ^{152}Tb -Ligand should be sufficient for a Patient Scan

PC-3 PIP: PSMA-positive
PC-3 Flu: PSMA-negative

EC-SLI (IS580)

Emission Channeling with Short-Lived Isotopes (online)

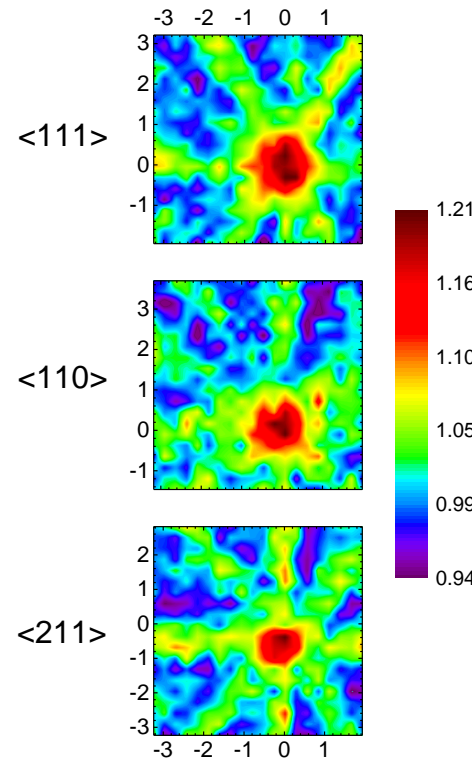
Successful emission channeling measurements on topological insulators



example spectra:
Mn-doped PbTe, implanted at 100 °C

⁵⁶Mn (2.6 h)

- Mn as magnetic dopant
- magnetic properties depend on Mn lattice site (e.g. substitutional *versus* interstitial)
- EC is used to determine the lattice location



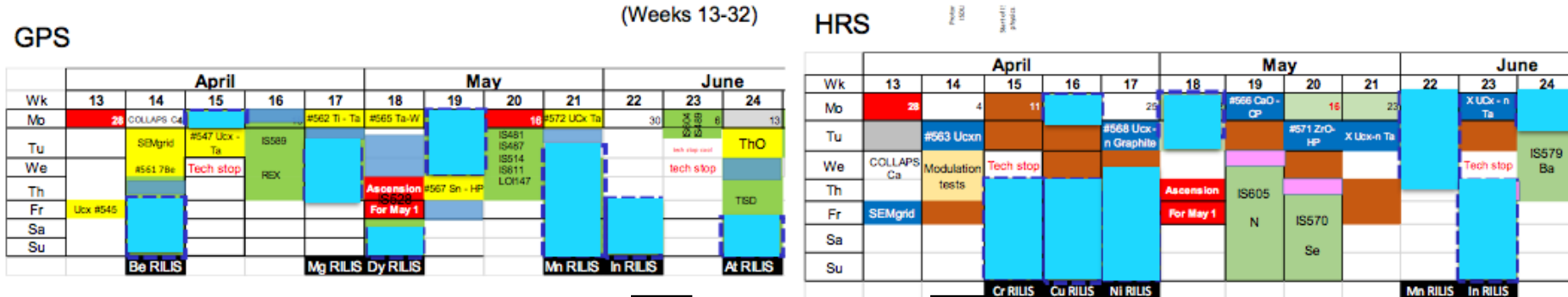
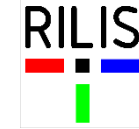
example spectra:
Sn-doped PbTe, implanted at 200 °C

¹²³Sn (40 min)

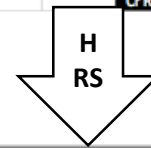
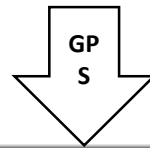
- parent: ¹²³In
- *isotope used for first time for EC*
- doping with Sn induces a rhombohedral distortion; the topological state (e.g. topological insulator, Rashba semiconductor, or trivial) depends on the magnitude of this distortion
- EC is used to characterize the distortion

Increased intensity of RILIS operation

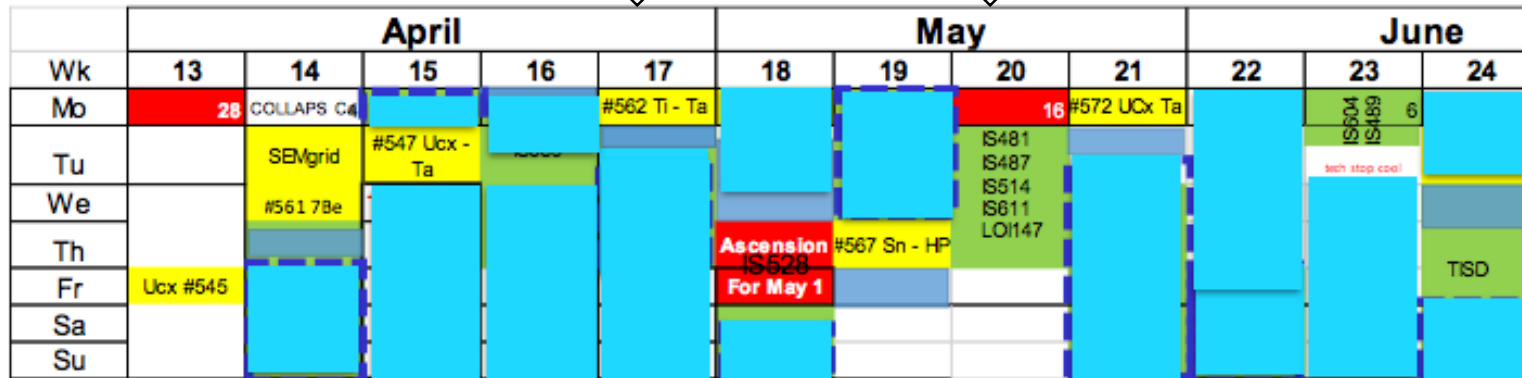
- thanks to new RILIS operating guidelines



On-call operation for ALL standard RILIS runs



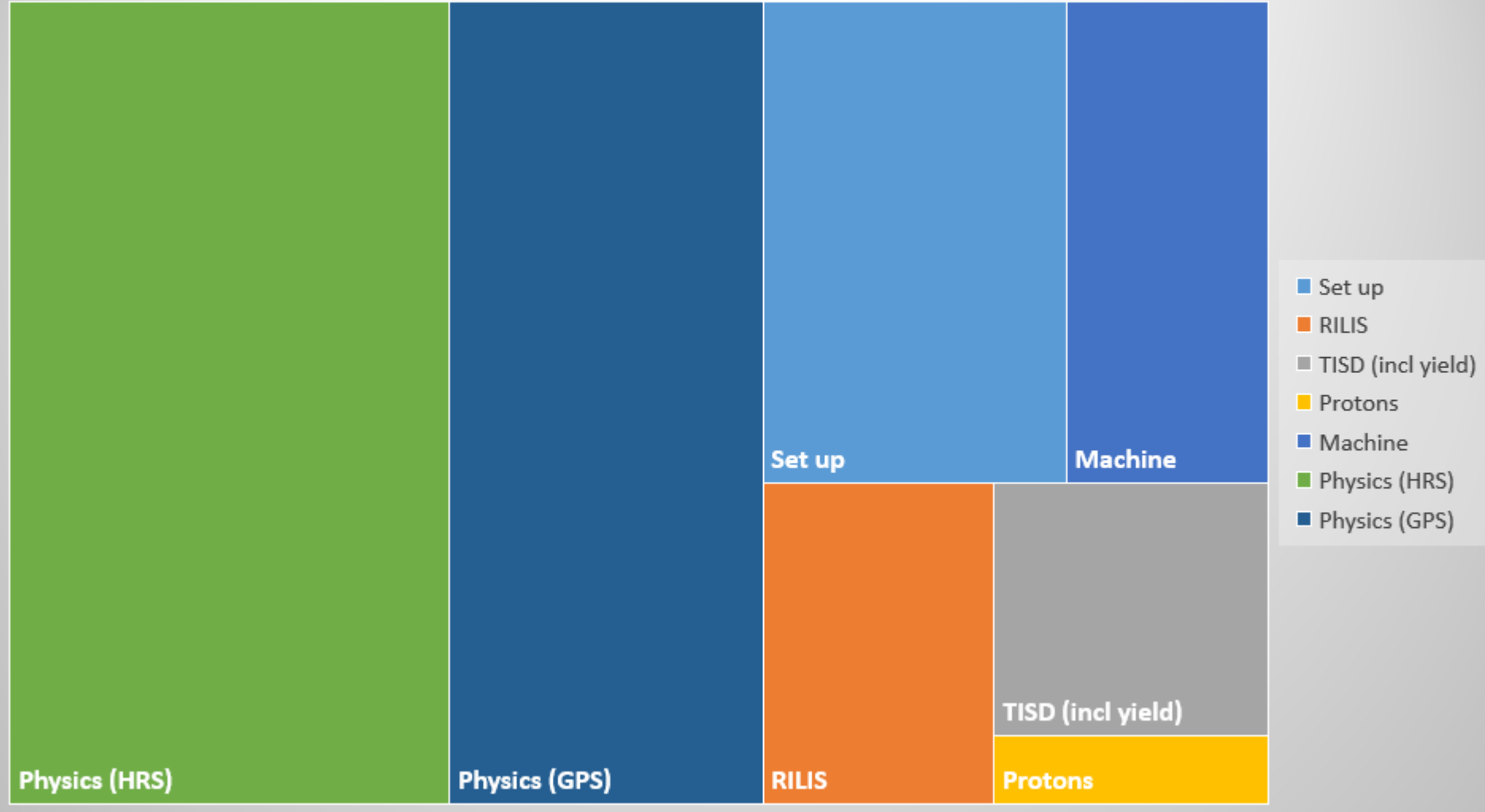
100 % success rate so far in 2016



Advantages:

- No restriction on total number of operating hours
- No restriction on number of consecutive weekends of operation
- Improved ease of scheduling and # of RILIS runs for USERS

Quick breakdown



More precise values coming later...1-2 shifts of setup can mean cover days

Conclusions and Reality...

- 24 approved proposals ask for beam time in 2016 → won't be able to serve more than 7
- Full energy range of accelerator up to 6.0 MeV/u → 5.5MeV/u
- Mass range from ^{18}N up to ^{228}Ra → intermediate masses
- MINIBALL configuration for Coulomb excitation and transfer reactions will be installed for 2016 campaign → going to go with C-REX
- Combination with SPEDE is available after successful stable beam commissioning in summer 2016 → tests continuing
- High number of experiments should be provided to user community → 7 possible
- Everyone is eagerly awaiting the HIE-ISOLDE beams → no argument there...

Beams 2016: chosen for intensity, and ramping up of A/q etc

108Sn, 80Zn, 142Xe, 132Sn, 9Li, 59Cu(?), 66Ni? 70Se?

Draft HIE ISOLDE SCHEDULE 2016

GPS

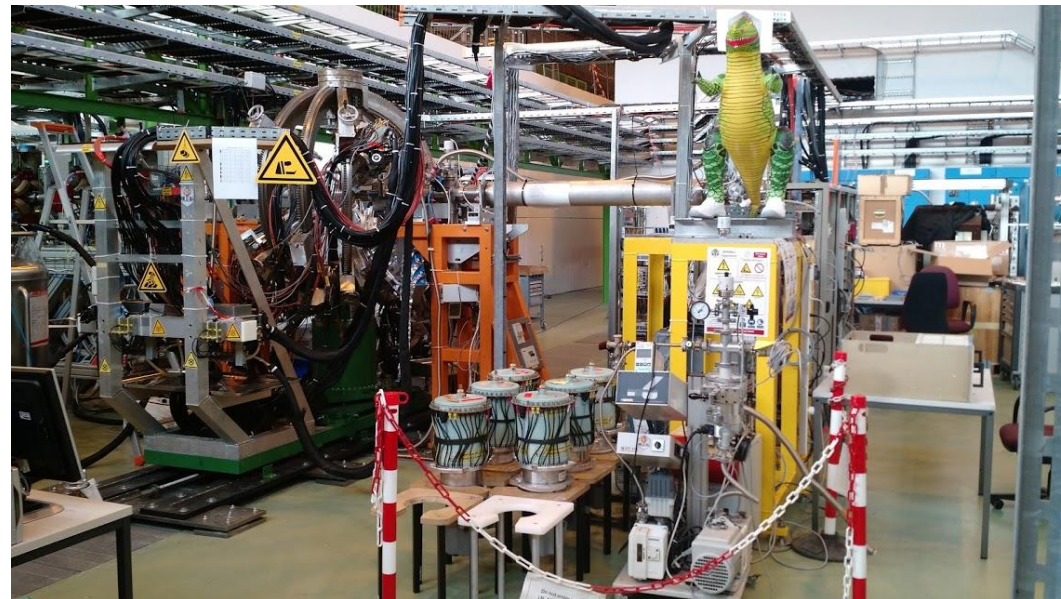
		September					October					November			
33	34	35	36	37	38	39	40	41	42	43	44	45	46		
15	22	29	5	12	19	26	3	10	17	24	Ta -W	7	14		
Machine scaling from EBIS (day)	Optics model benchmarking (EBIS/Day)	Setup IS607 Low Energy	HIE physics on HRS	HIE Physics on HRS	setup for IS557	physics 80Zn to miniball	physics 78Zn to miniball	UC Ta	IS551 132Sn @ 5.5meV/n MB	IS551 132Sn @ 5.5meV/n MB	Ucx Ta	9Li @ 7.2MeV/u (XT02)	IS569 65Ni @ 5.5meV/u MB		
		Setup IS607 Low Energy												Jeune	Ucx qn
Stable beam to XT01 (3.85; 14N4+)	Stable beam to miniball (EBIS)	Physics IS607 59Cu. Ind daily 0.5 linac setup (XT02)													
						RILIS Zn	RILIS Zn			RILIS Sn			RILIS Ni		

HRS

		September					October					November			
33	34	35	36	37	38	39	40	41	42	43	44	45	46		
15	22	29	5	12	19	26	3	10	17	24	31	7	14		
Machine scaling from EBIS (day)	Optics model benchmarking (EBIS/Day)	HIE ISOLDE on GPS	Setup IS562	Jeune	Setup IS562	HIE ISOLDE on GPS	UC CP	IS548 142Xe @ 4.5 to MB	HIE ISOLDE on GPS	HIE ISOLDE on GPS	HIE ISOLDE on GPS	HIE ISOLDE on GPS	HIE ISOLDE on GPS		
			Setup and stable for IS562		Setup IS562									IS548	
Stable beam to XT01 (3.85; 14N4+)	Stable beam to miniball (EBIS)		IS562 108Sn @ 4.5meV/n MB	IS562 110Sn @ 4.5meV/n MB											

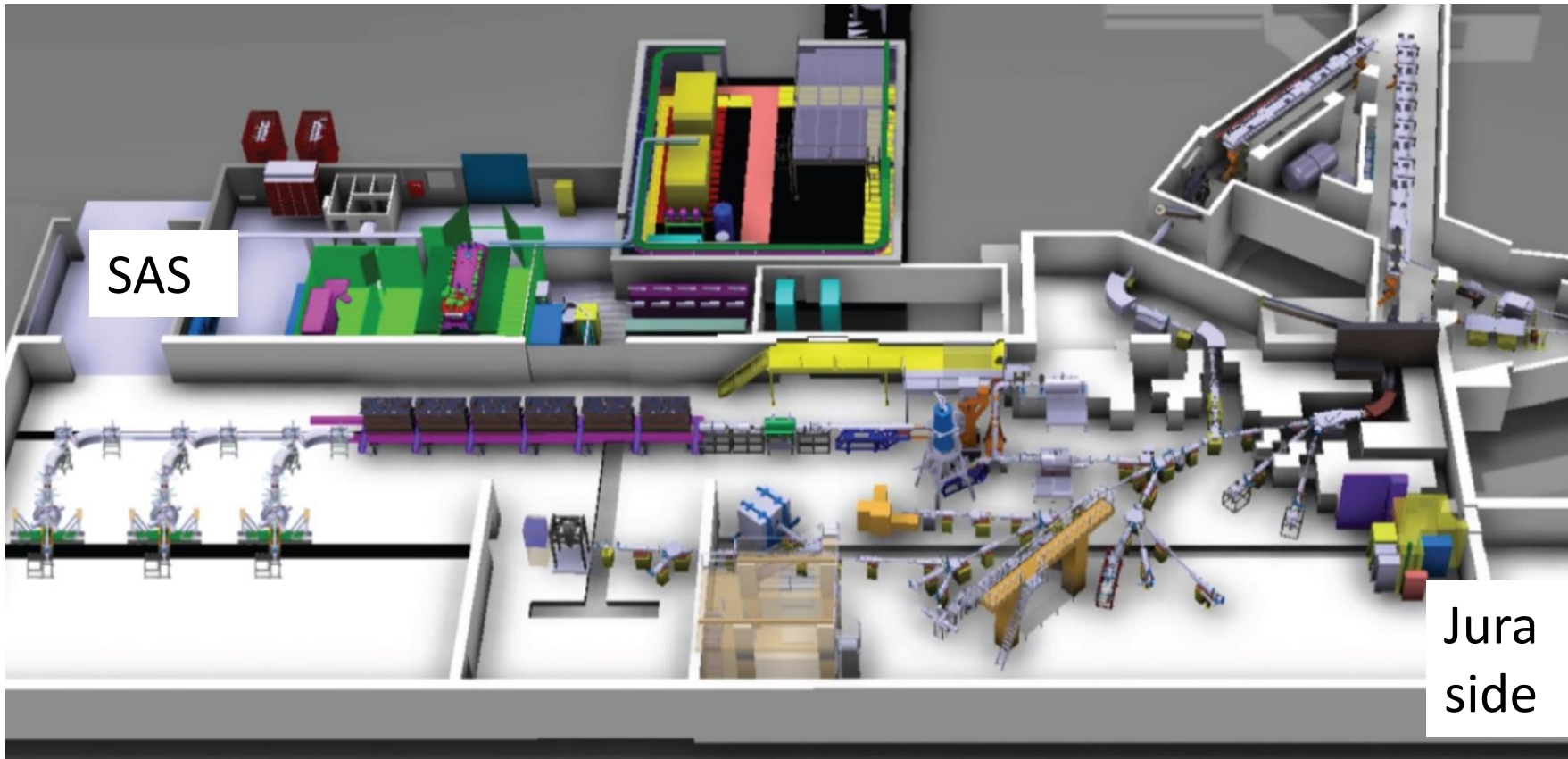
Going to change further....probably some experiments have to be cut...

Activities in the hall....



Access to ISOLDE

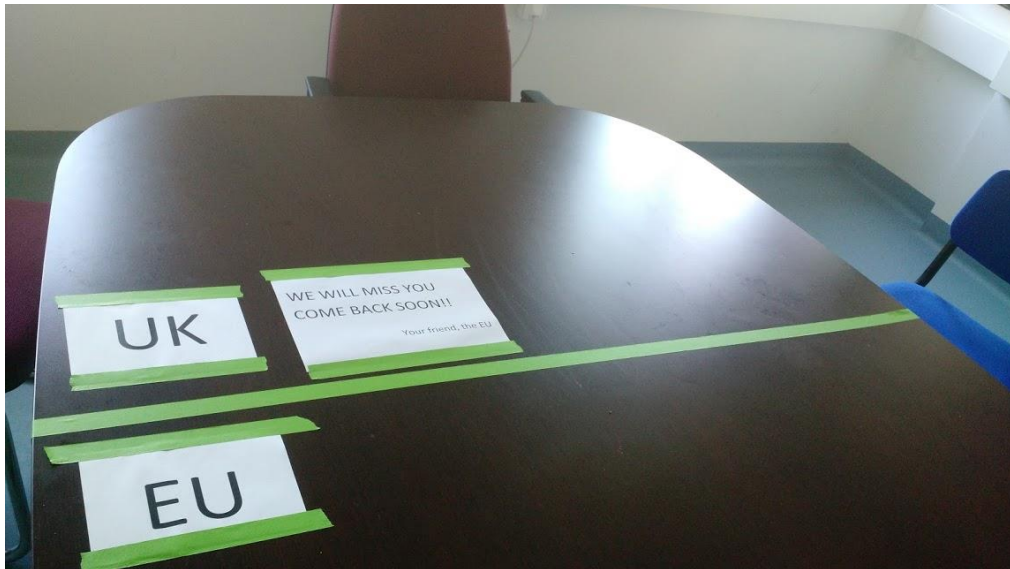
- ISOWORK has been suppressed. Now only **ISOHALL**.
- Access to HIE-ISOLDE recommended for only local physicists when moving equipment or dewars etc
- Access for users is still at the Jura side.
 - **Tourniquet at 508 controls access to the hall in addition to access door in Building 508. Both operated via dosimeter.**



Safety and courses

- For all setups: fixed and travelling: **safety clearance required before RUNNING**
 - Travelling setups – template will be send some weeks before running, small safety visits/checks once setting up started
 - Contact your local contacts in case of questions
- Courses in 2016 for all: (as for 2015)
 - Online: general and ISOLDE RP, electrical awareness
 - 2-h ISOLDE RP (for everybody, not only new users and new dosimeter requests)
 - 1.5-h ISOLDE electrical safety.
 - Hands-on courses take place on Tuesday afternoons. May have more in the year if necessary e.g. during HIE-ISOLDE period.
 - Some training under review. Need for refreshing courses etc (probably going to be electronic for the first renewal at least).
 - **Courses need to be validated in EDH**
 - **Hands on course to be “hard-linked” from July 1st**
- No longer an ongoing discussion: Need for safety helmets and shoes. For short term visitors building up a supply of spares...
- Adopt better practice for controlling on leaving the hall...



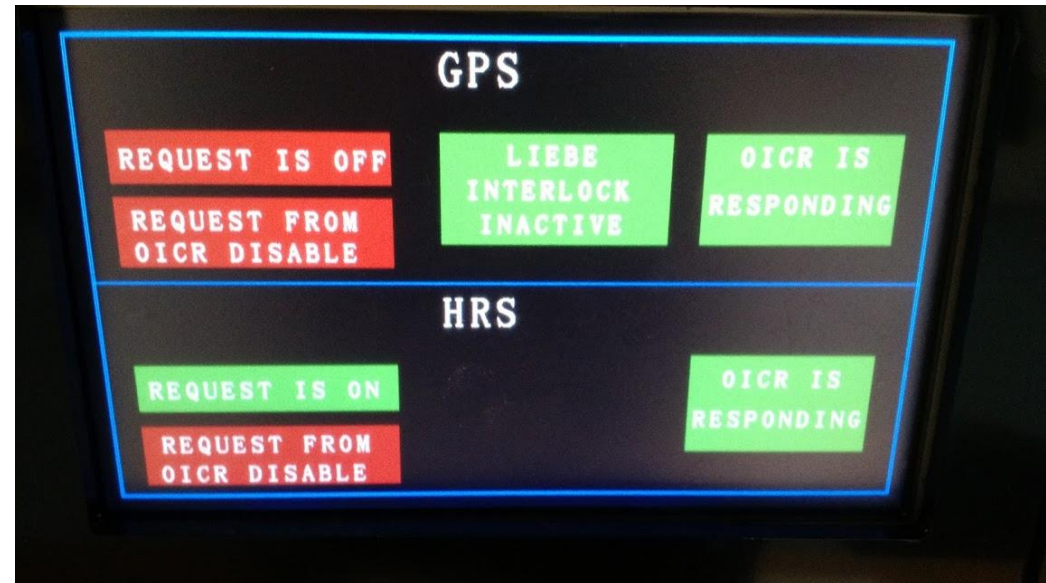
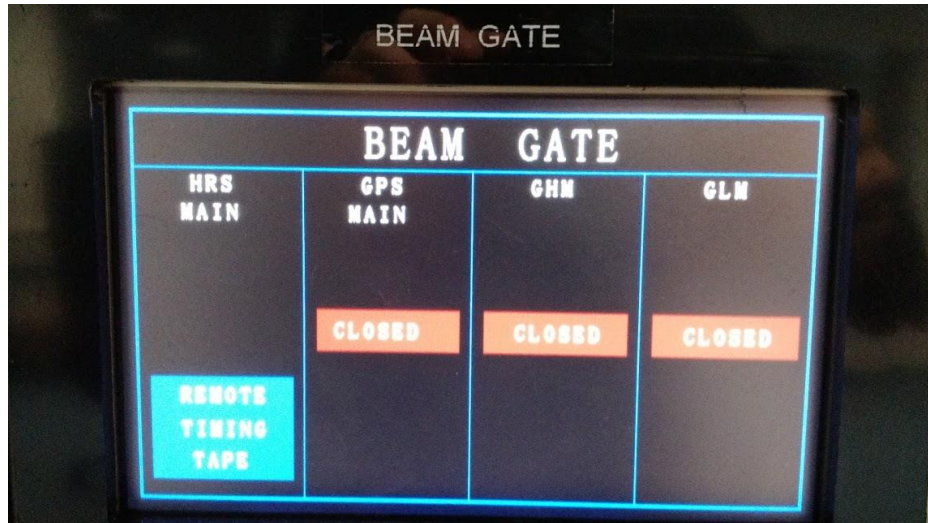


508: New control room

And kitchen....



Beamgates etc



VISITS TO ISOLDE

