



# ISOLDE Physics Report

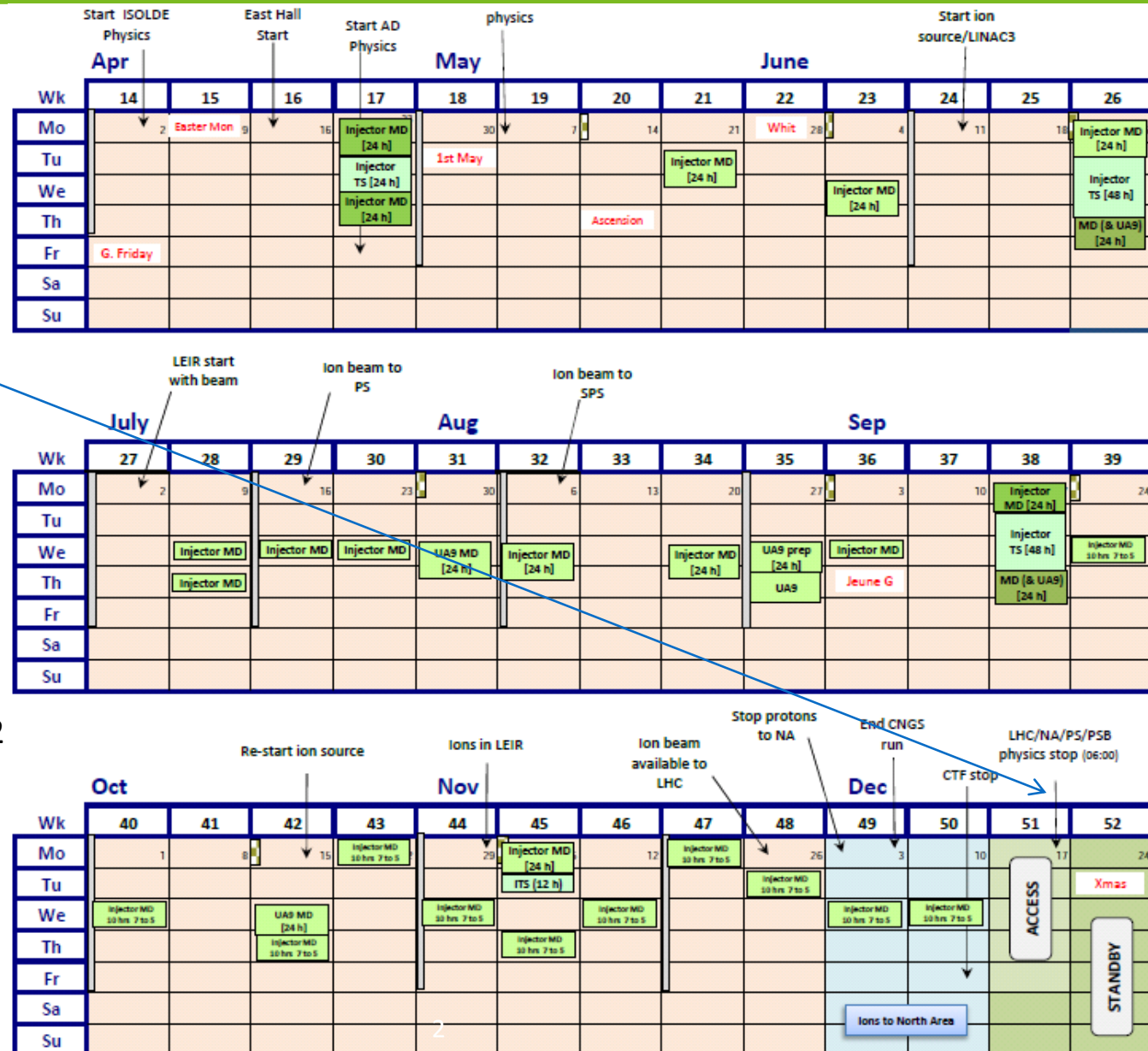
Magdalena Kowalska



# Injector schedule since last meeting

September:  
confirmation of 2  
more weeks with  
protons – until  
December 17<sup>th</sup>:  
35 -> 37 weeks of  
physics (vs 29  
weeks in 2011)

physics started April 2  
protons stop Dec 17





# ISOLDE schedule – Oct 26th

**Mid-October:** GPS problem - extraction electrode stuck in the middle of target valve -> only light targets allowed

=> **new ISOLDE schedule**

v4.0, 26<sup>th</sup> Oct:

- All GPS runs rescheduled (some shifts cut), partly in 2 additional weeks
- Failed summer run (11Be) also rescheduled
- CaO and offline 44Ti on GPS

=> **No IS experiment cancelled**  
(3 collection LOIs cancelled)

**Usual pdf version under preparation**

	info	GPS	HRS
44	29-Oct		cu IS535 ISOLTRAP 10.5
	30-Oct		cu IS535 ISOLTRAP 12.5 yields - from midnight
	31-Oct	injector MD (fixed p-cycle) injector MD (fixed p-cycle)	Ag rex2
	1-Nov		Ag -IS488 + a bit Bonn rex3
	2-Nov		IS475 - 222Ra 3
	3-Nov		Ag-Is488 LA1 cooling 83Rb at LA1 with p off IS500
	4-Nov		cooling 83Rb at LA1 with p off 219S500
	5-Nov	injector MD (fixed p-cycle) injector MD (fixed p-cycle) injector MD (fixed p-cycle)	target change UC-Re setup in CA0
45	6-Nov	tech stop, no p tech stop, no p	rex1 (p-scan, Fr - Tania?)
	7-Nov		p-scan yields 83Rb or Fr (Tania) -LA1
	8-Nov	injector MD (fixed p-cycle) injector MD (fixed p-cycle)	rex2
	9-Nov		98Rb IS536 T-REX 4.5
	10-Nov		98Rb IS536 T-REX 7.5
	11-Nov		98Rb IS536 T-REX 10.5
	12-Nov	target change CaO-helicon setup stable beam to LA2, yields	cooling beam to Mistral or emitt. meter
	13-Nov	p-scan yields - C, 31Ar 3	cooling (if GPS not ready: witch/emittance meter)
46	14-Nov	injector MD (LA2: IS445(C) or IS476 (31Ar) injector MD (IS445(C) or IS476 (31Ar) 3	target change CaO-vadis
	15-Nov		setup rex-trap setup stable beam to WITCH?
	16-Nov	31Ar or HRS for witch? IF 35Ar fine, WITCH on GPS	p-scan, yields
	17-Nov	(WITCH - if yields fine)	WITCH (if GPS yields low) IS433 4.5
	18-Nov	(WITCH - if yields fine)	WITCH IS433 7.5
	19-Nov	injector MD (WITCH - if yields fine) injector MD (fixed p-cycle)	WITCH IS433 10.5
	20-Nov	(WITCH - if yields fine)	WITCH IS434 13.5
	21-Nov		emittance-meter tests LA1 Mn target change UC-surf
47	22-Nov	target change 44Ti	setup stable beam to collaps p-scan yields
	23-Nov	ion source setup	

48	24-Nov		Mn (SSP short shots) IS508 COLLAPS 4.5
	25-Nov		Mn IS508 COLLAPS 7.5
	26-Nov	ion source setup	Mn IS508 COLLAPS 10.5
	27-Nov	injector MD (setup in CA0 injector MD (fixed p-cycle)	Mn 11 IS453, IS489, IS501 1.5
	28-Nov	rex1	LA1 IS453, IS489, IS501 3
	29-Nov	rex2	LA1 IS453, IS489, IS501 4.5
	30-Nov	rex3 44Ti	24Na source for TAS
	1-Dec	44Ti- REX 2nd line IS543 4.5	cooling
49	2-Dec	44Ti IS543 7.5	cooling
	3-Dec	emis emis 10.5	target change Pb-VADIS
	4-Dec		setup (p-scan) (IS488, IS515, I87, I131) 1.5
	5-Dec	injector MD (fixed p-cycle) injector MD (fixed p-cycle)	p-scan (in no time Tue) TAS
	6-Dec		TAS IS539 Hg 4.5
	7-Dec		SSP during TAS mass change IS539 Hg 7.5
	8-Dec		TAS IS539 Hg 10.5
	9-Dec		TAS IS488, IS515, I87, I131 1.5
50	10-Dec	rex 44Ti, IS543, REX 2nd line 13.5	target change UC-Re (material tests)
	11-Dec	44Ti, IS543 (15)	setup stable beam to LA2
	12-Dec	injector MD (fixed p-cycle) injector MD (fixed p-cycle)	p-scan yields IS540 2
	13-Dec		IS540 - yields 3.5
	14-Dec	REX cooling off	IS451, 11Be, LA2 1.5
	15-Dec		11Be IS541 4.5
	16-Dec		IS541 7.5
	17-Dec	proton STOP - 6AM	IS540 - yields 9 (RILIS offline tests) 5
51	18-Dec	turn off ISOLDE power supplies	
	19-Dec		
	20-Dec	turn off ISOLDE cooling water	

# Shifts 2012

**Shift balance: 1009 open shifts for IS experiments, 53 shifts for LOIs**

- Shift requests: 833 shifts for 71 IS exp vs 657.5 in 2010; 40 shifts for 14 LOIs
- 20 IS experiments with no beam requests
- REX requests: 377.5 shifts (IS + LOIs)

**Scheduled runs (since July – 2wk prolongation & GPS problem):**

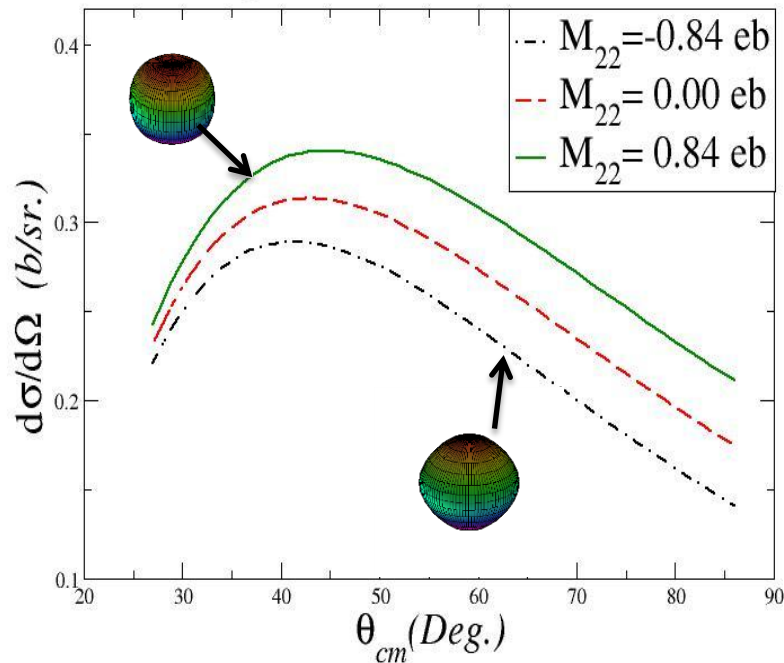
Scheduled	Oct 2012	July 2012	2011
All shifts (IS+LOI+MD)	565	579	491.5
Shifts for IS exp	539	537	440
Shifts for LOIs	26.5	36.5	
# of IS exp	51	53	
# of LOIs	10	13	
REX runs & exp	11 - 17	11 - 17	10? - 14
REX shifts (IS +LOI)	221.5	220	190.5
Average shifts/day	2.08	2.42	2.31

# IS478: Coulomb excitation of $^{72}\text{Kr}$

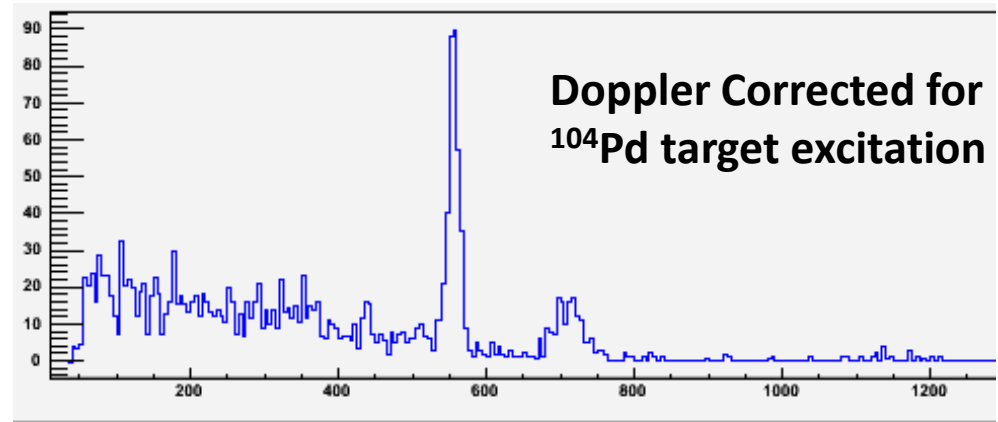
Oblate  $^{72}\text{Kr}$  expected

## The technique

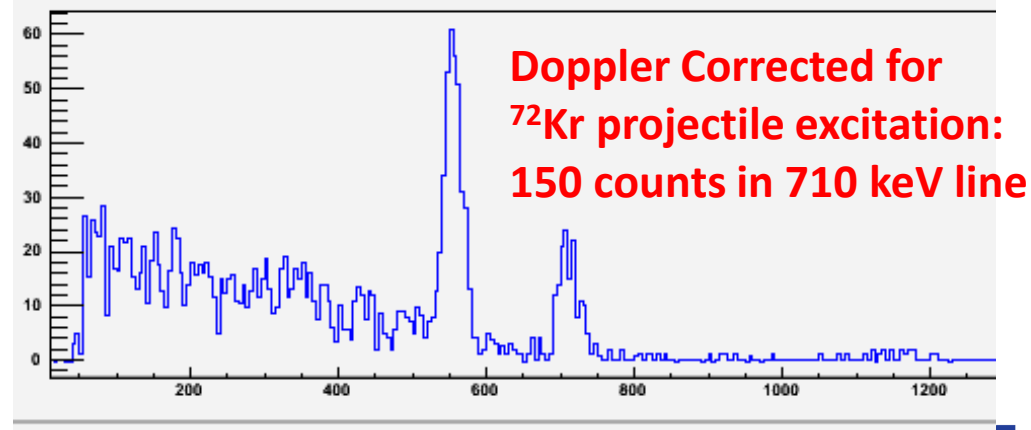
Coulex on  $^{104}\text{Pd}$  at  $E_{\text{lab}}(^{72}\text{Kr}) = 200 \text{ MeV}$   
 $2_1^+$  excitation cross section in  $^{72}\text{Kr}$



**Coulex Spectra** - number of counts in 710 keV depends on the shape of  $^{72}\text{Kr}$



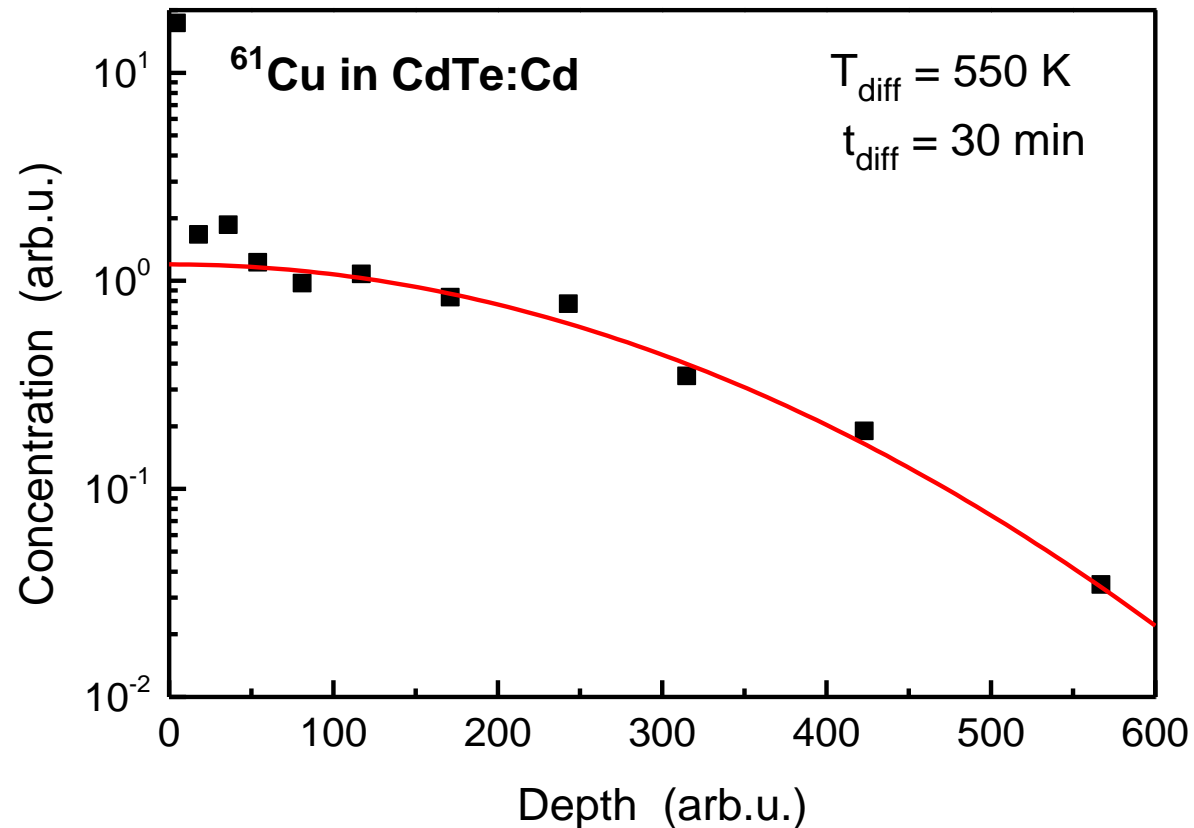
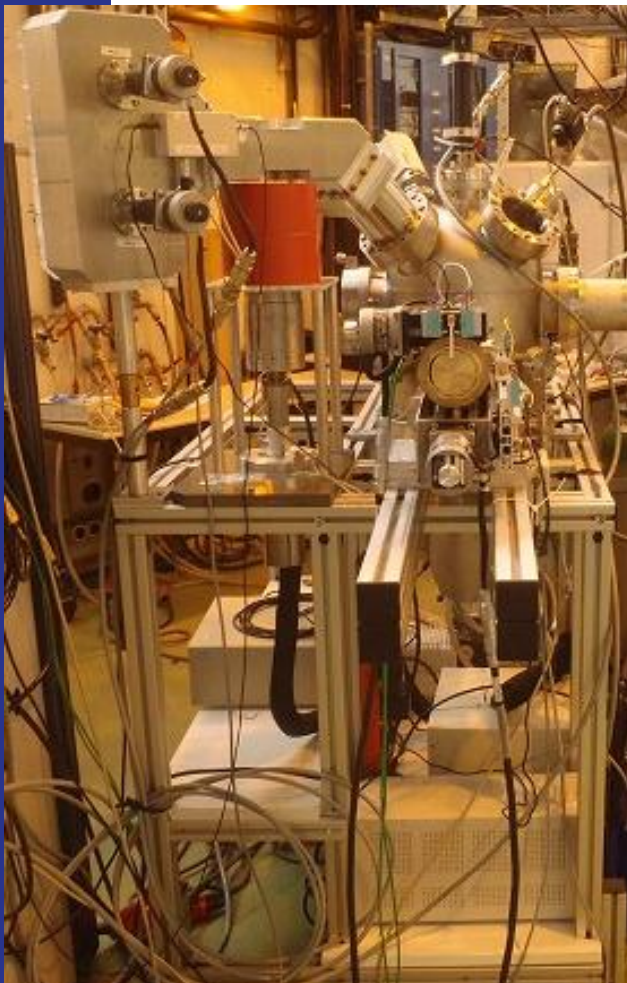
Doppler corrected, background subtracted, gate on projectile





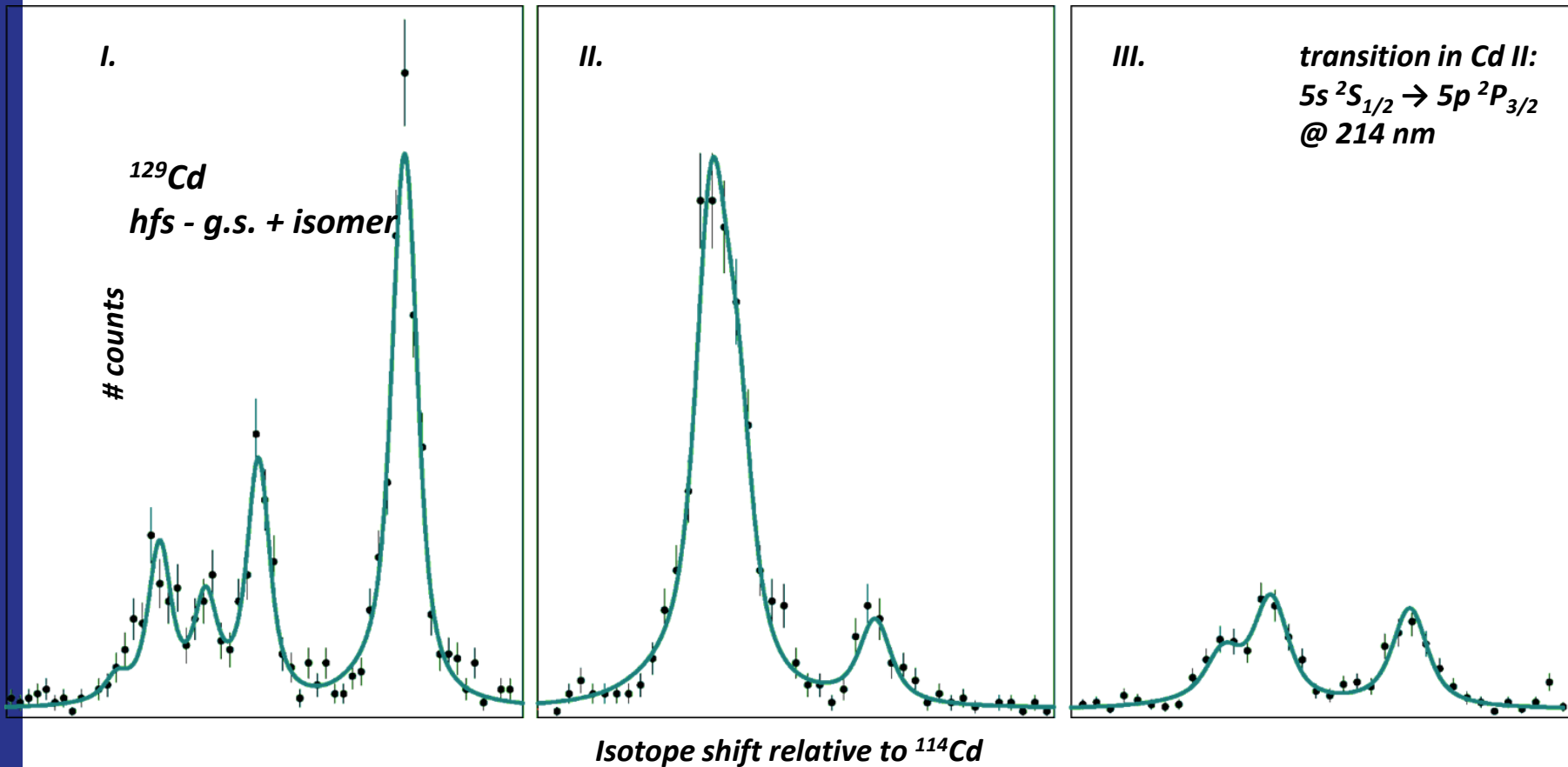
# IS492: first online diffusion spectra

- First concentration profile measured with the new online diffusion chamber.
- The absolute depth is estimated to be in the order of about 2  $\mu\text{m}$ .
- (CdTe: Cd means Cd-rich CdTe material)



# IS497: Collinear laser spectroscopy on Cd

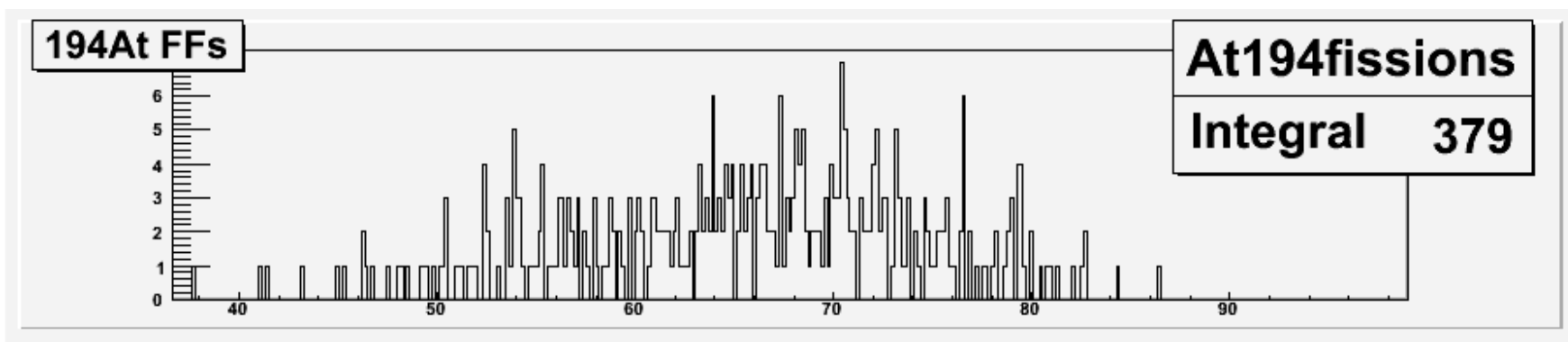
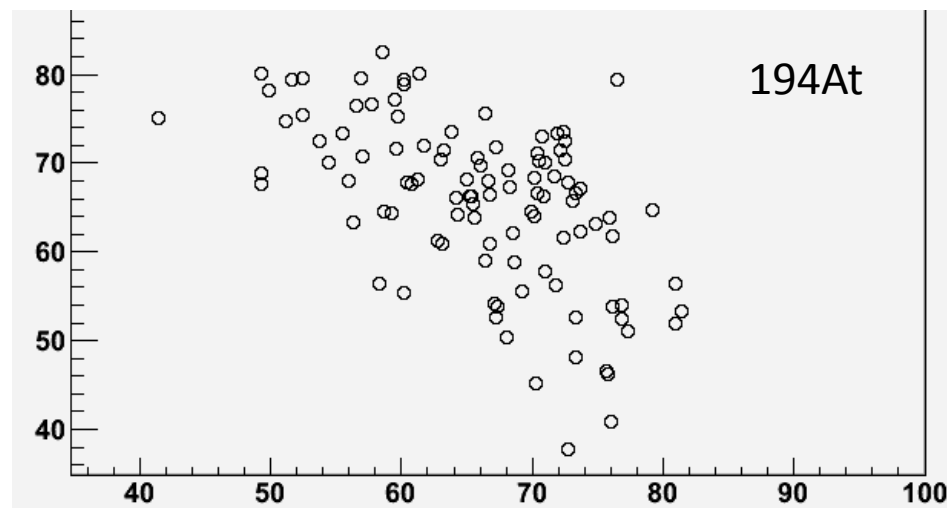
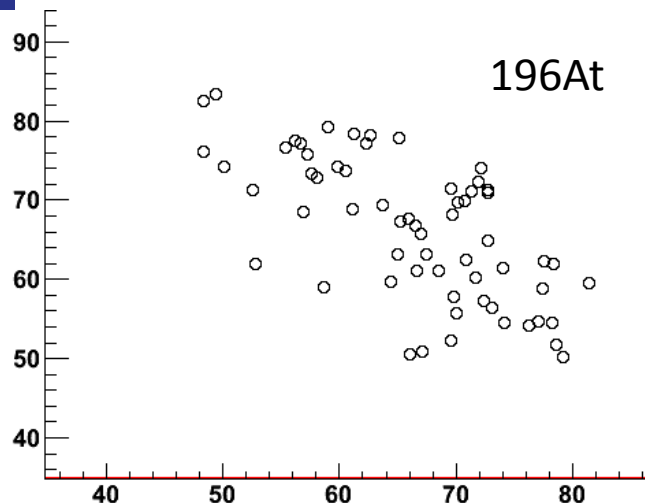
- Spins, charge radii and moments of 99-130Cd
- Discovery on new long-lived isomers in 125,127,129Cd





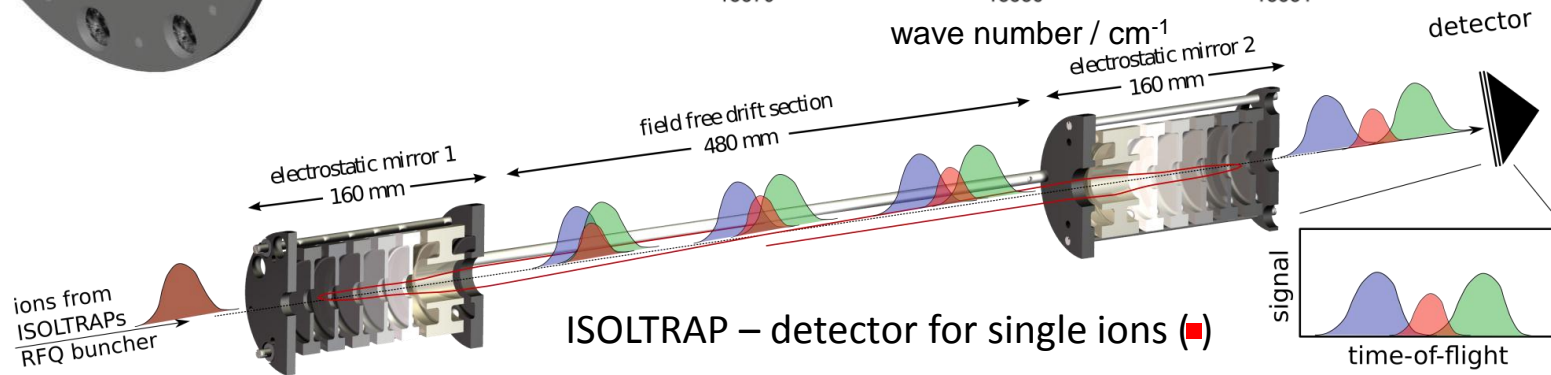
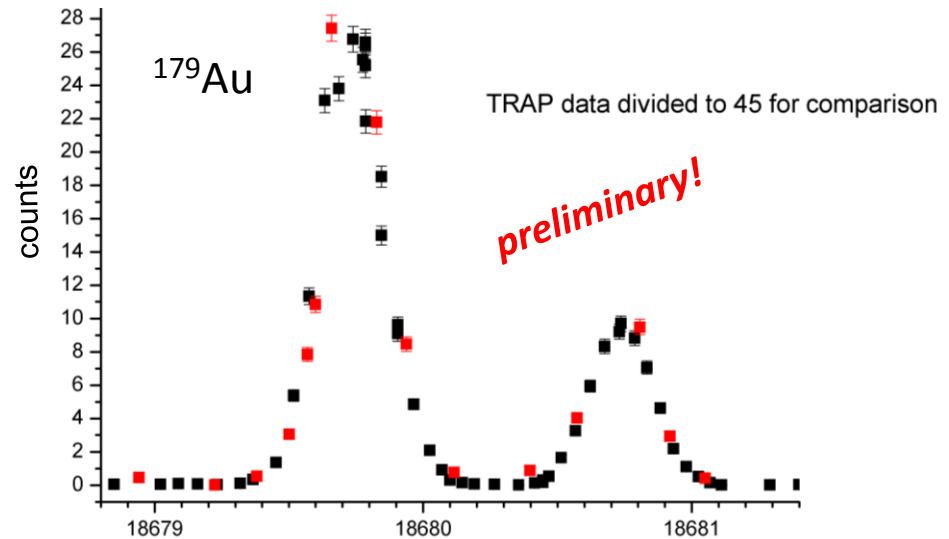
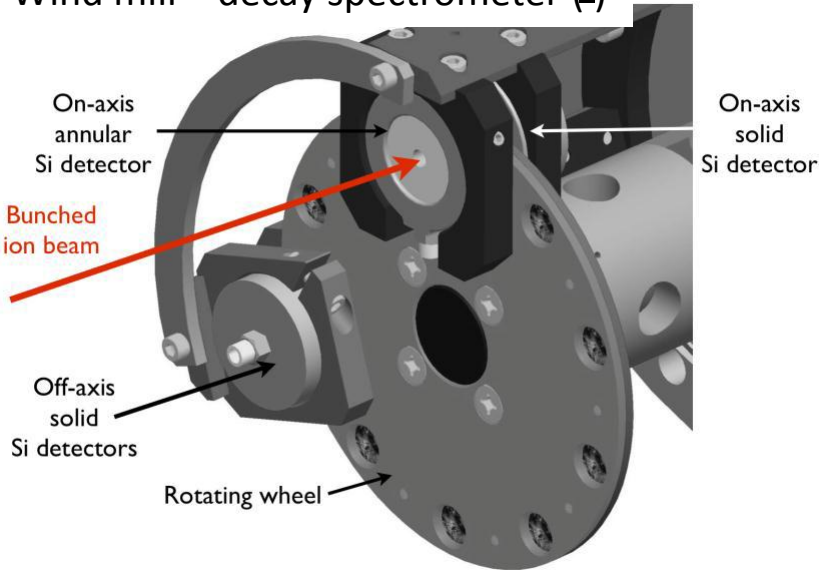
# IS534: beta-delayed fission of At

● Mass Distributions Measurements of  $^{194,196}\text{Po}$  via  $\beta$ -delayed fission of  $^{194,196}\text{At}$



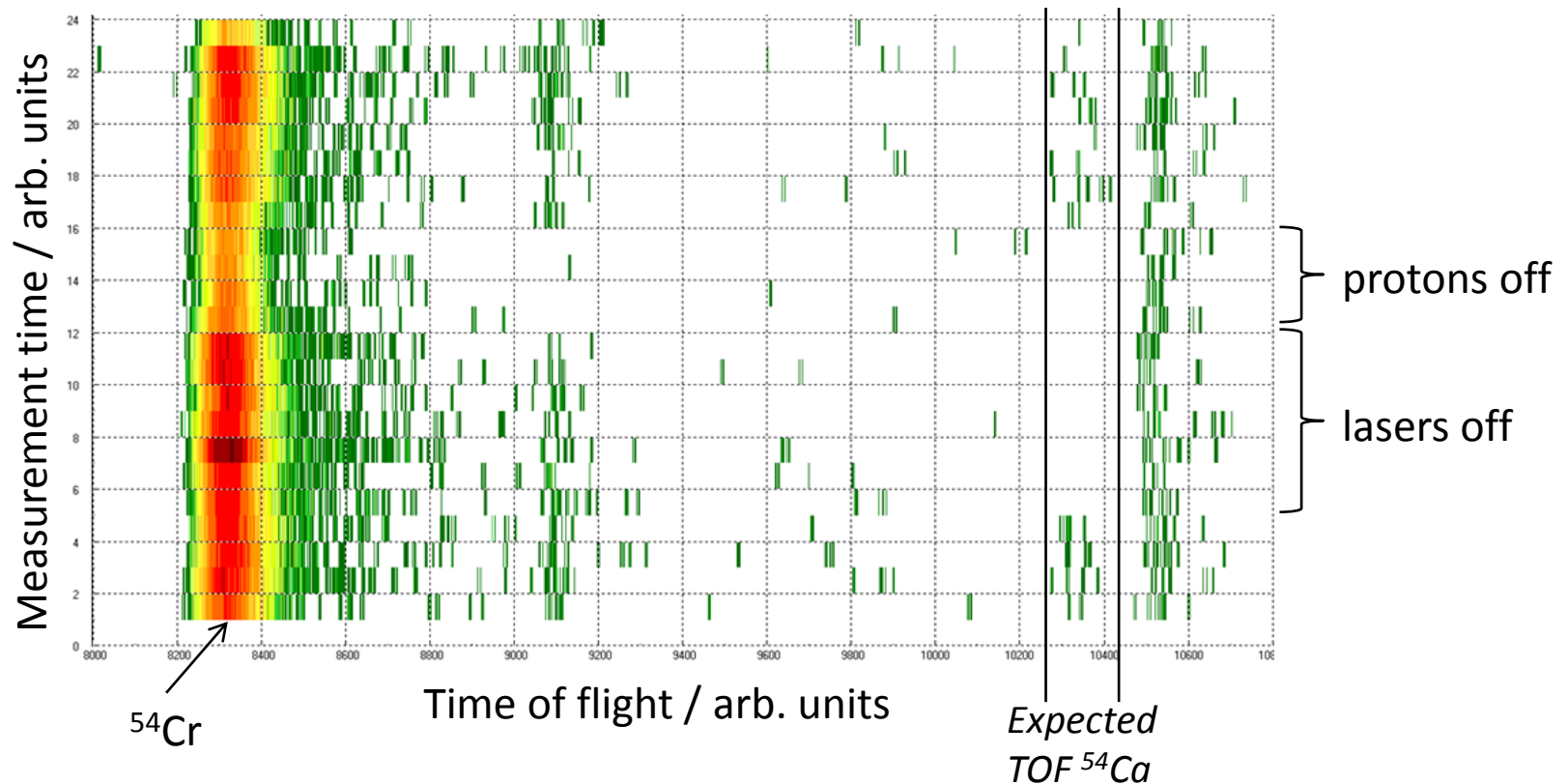
# IS518& 534: Laser Spectroscopy of n-deficient Au

Wind mill – decay spectrometer (■)



- HFS studies: all isotopes are accessible due to complementarity (decay vs. counting)
  - Region of deformed nuclei in neutron-rich gold isotopes
- State-selective spectroscopy on pure samples (isomer selectivity at RILIS + isobar selectivity at ISOLTRAP)
  - Determination of excitation energies


# IS532: N-rich Ca masses at ISOLTRAP



- Masses of  $^{51,52}\text{Ca}$  measured with conventional TOF resonances in ISOLTRAP's precision trap. Agree with TITAN, uncertainty reduced by at least a factor of 10
- Direct mass-measurement using the MR-TOF on  $^{52-54}\text{Ca}$
- On mass 54, 2000 ions detected in the TOF window of calcium.

# New techniques (LOIs) in the summer

- Very successful LOI runs based on new experimental techniques:
  - Jul: spin polarization with tilted foils behind REX - % beta-NMR signal on 8Li
  - Aug: beta-NMR on liquids for biophysics – 1<sup>st</sup> liquid beta-NMR signal (31Mg in ionic liquid)
  - Aug & Oct – CRIS shows expected detection efficiency and reaches 202Fr

 **The Bulletin**   english | fr

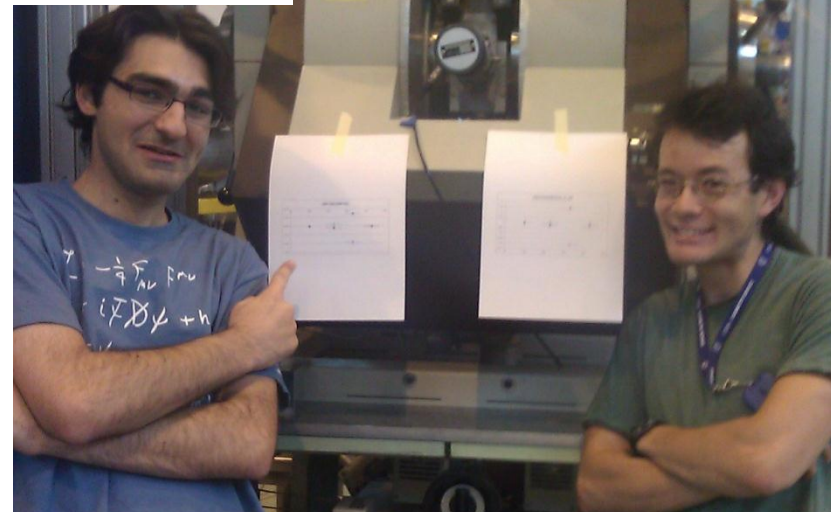
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- Summer Student takes ISOLDE by surprise
- Tight turns

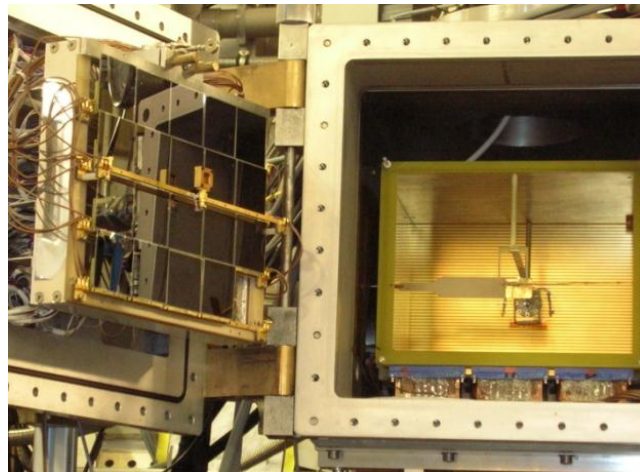
**That's one small drop for Mankind...**

In August, the members of an ISOLDE project called LOI88 successfully employed a new technique to study the interaction of metal ions in a liquid. It's the first time that specific ions have been studied in a liquid medium - a technical achievement that opens promising doors for biochemistry.



# New setups in the summer

- Successful experiments with new setups & by new groups:
  - $^{21}\text{Na}$  and  $^{31}\text{Mg}$  with REX scattering chamber (Lund and Tokyo);
  - $^6\text{He}$  with opt. time-proj. chamber (Warsaw);
  - $^{34}\text{Mg}$  with fast tape-station (Bucharest)
  - $^{12}\text{Be}$  with active target MAYA;



# Long shutdown

- Presently: first protons to ISOLDE at the end of June 2014
- Access to ISOLDE: with permanent dosimeter, helmets and safety shoes; under discussion whether safety equipment will stay after LS1