



Measurement of the Isomeric Yield Ratios of Fission Products with the JYFLTRAP

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CERN, 1.10.2013



Outline

- * Main goal of the measurement
- * Experimental method
- * Difficulties at the preparation
- * Results



Isomeric pairs proposed for the measurement

59

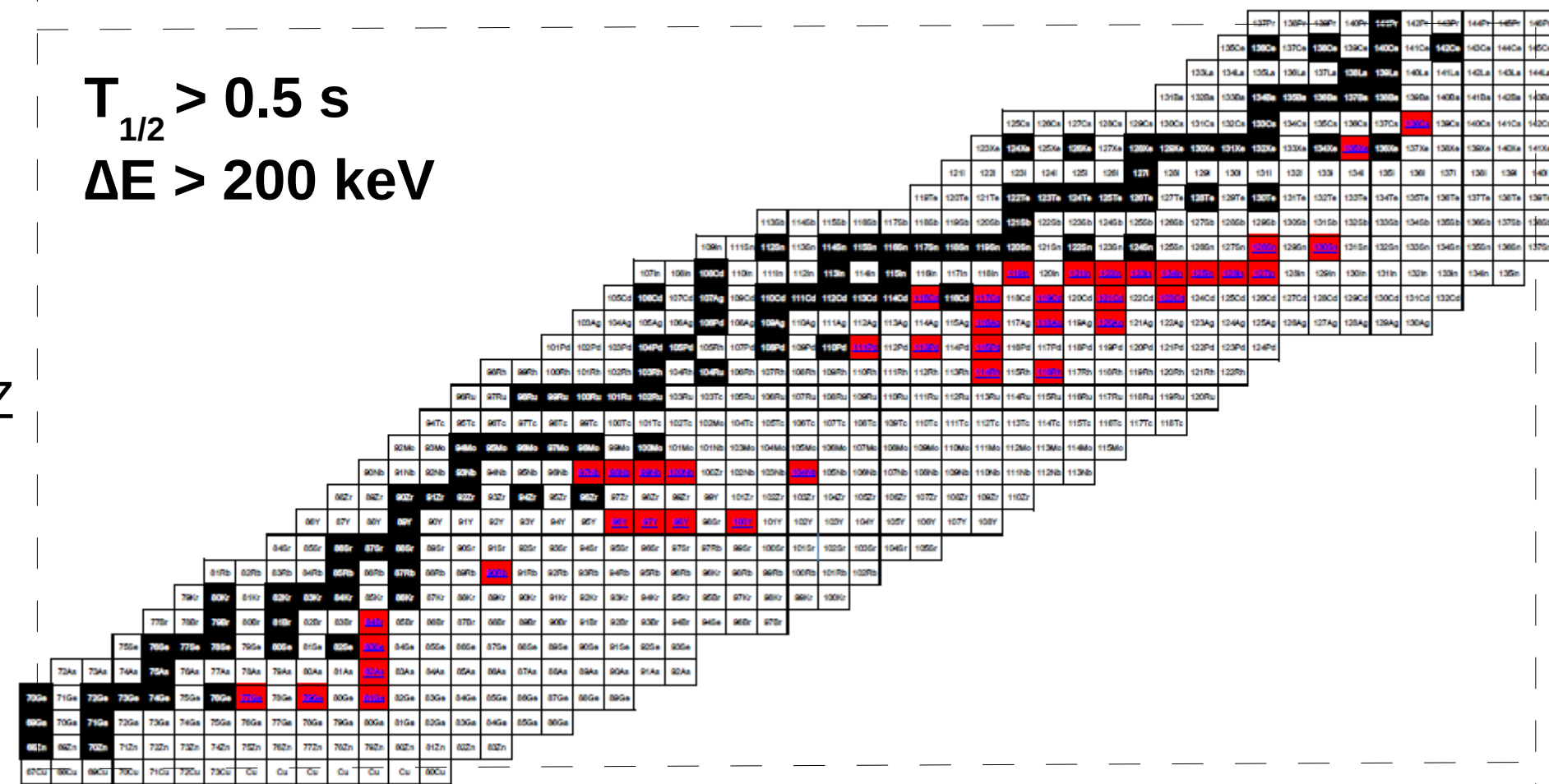
$T_{1/2} > 0.5 \text{ s}$

$\Delta E > 200 \text{ keV}$

Z

29

N



38

87

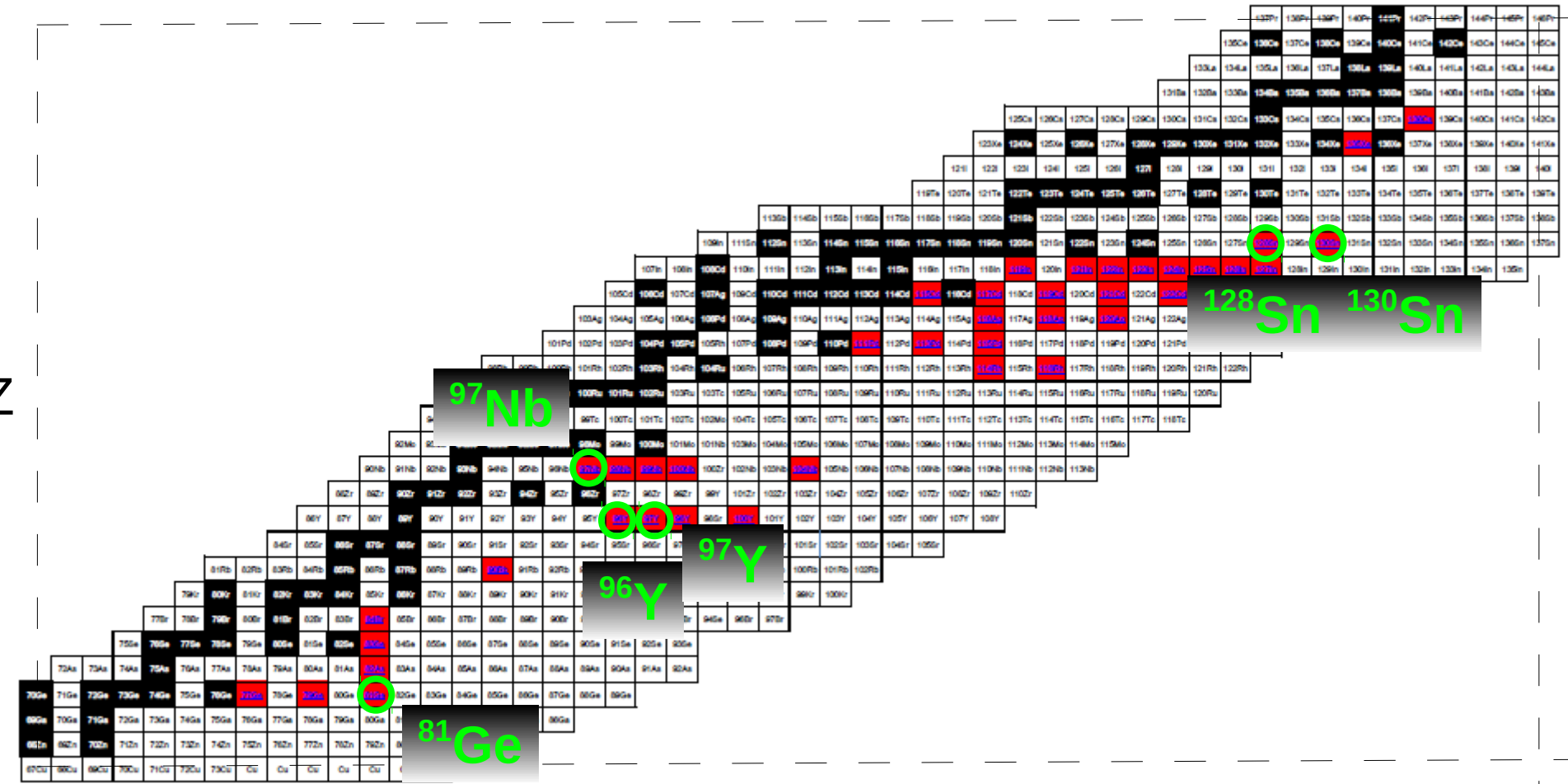


Isomeric pairs proposed for the measurement

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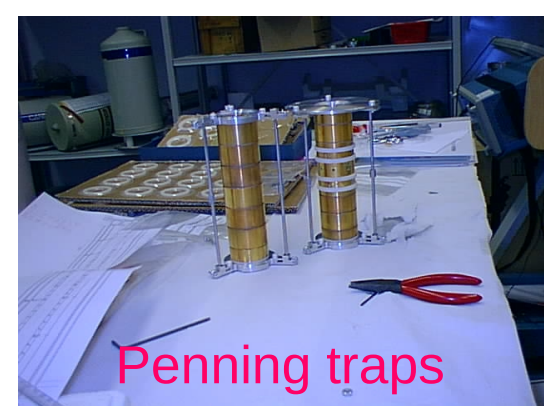
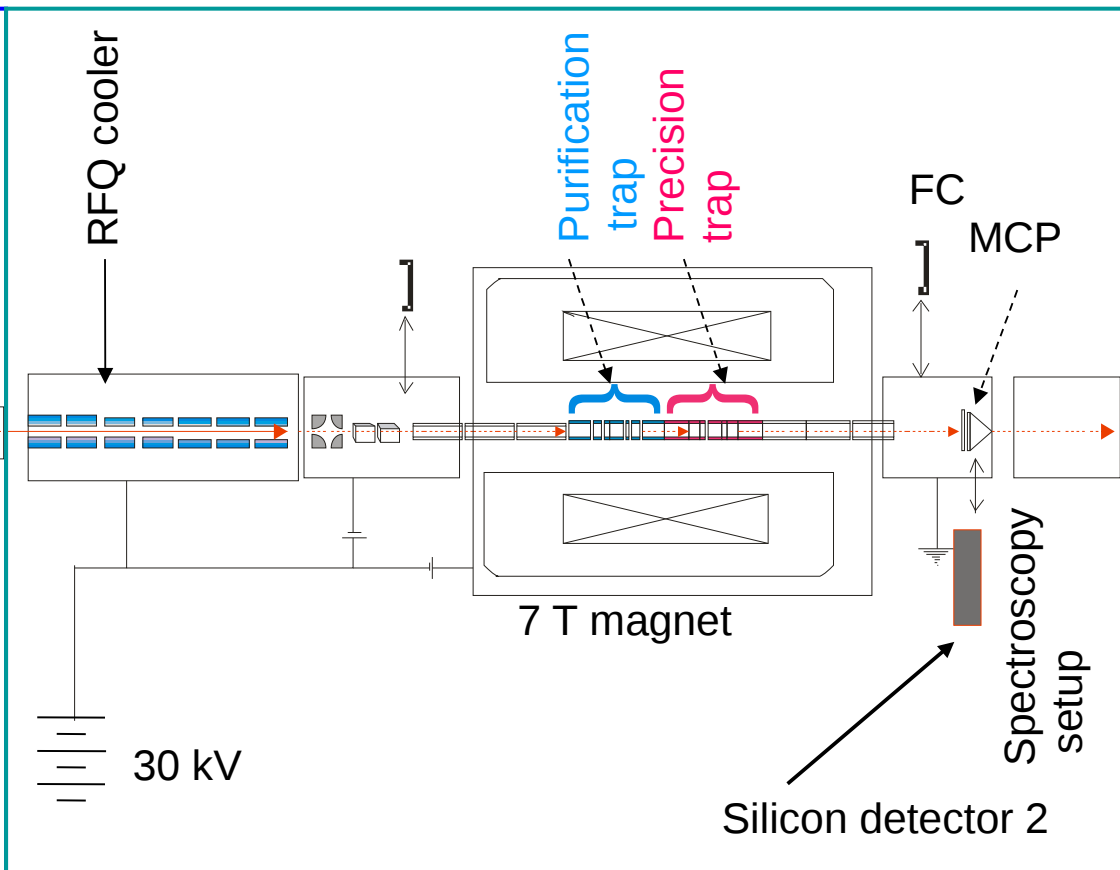
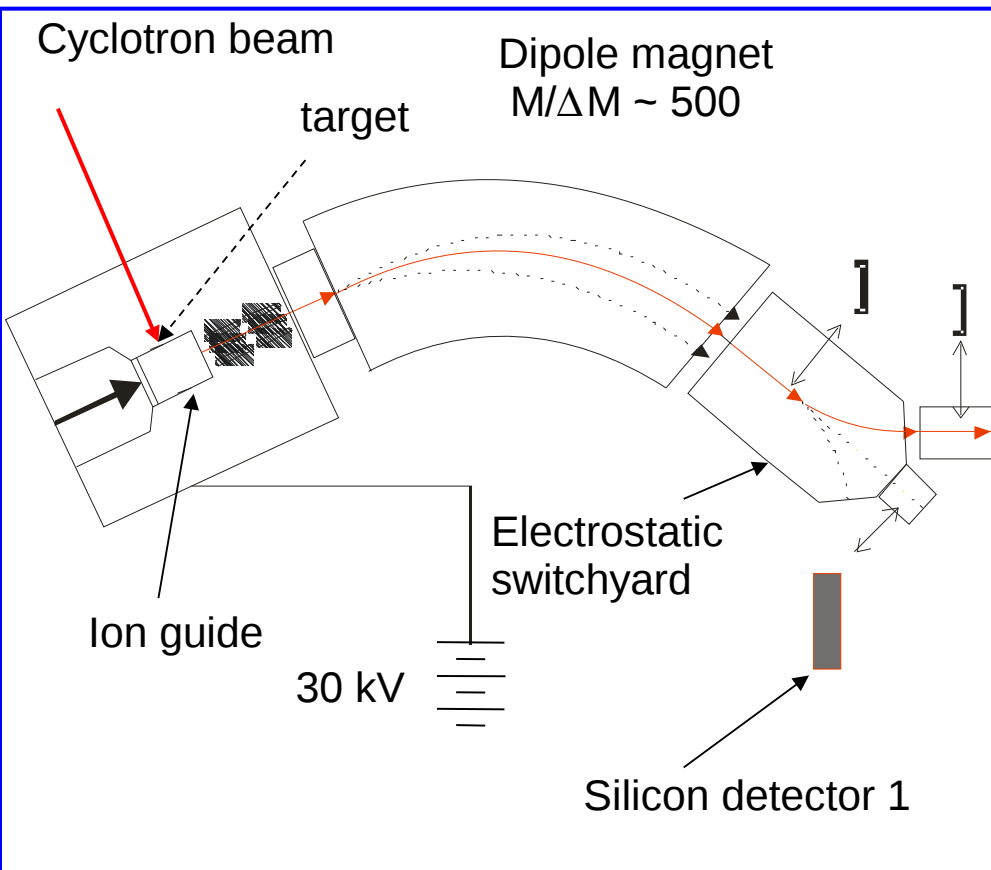
Isomeric pairs which can be separated by purification trap

Isotope	T 1/2	Jp	Isomer	Jp	E(level)	T 1/2
81Ge	7.6 s	9/2+	81mGe	1/2+	0.679	7.6 s
96Y	5.34 s	0-	96mY	8+	1.1400	9.6 s
*97Y	3.75 s	(1/2-)	97mY	(9/2+)	0.6675	1.17 s
97Nb	72.1 m	9/2+	97mNb	1/2-	0.7434	58.7 s
128Sn	59.07 m	0+	128mSn	(7-)	2.0915	6.5 s
130Sn	3.72 m	0+	130mSn	(7-)	1.9469	1.7 m



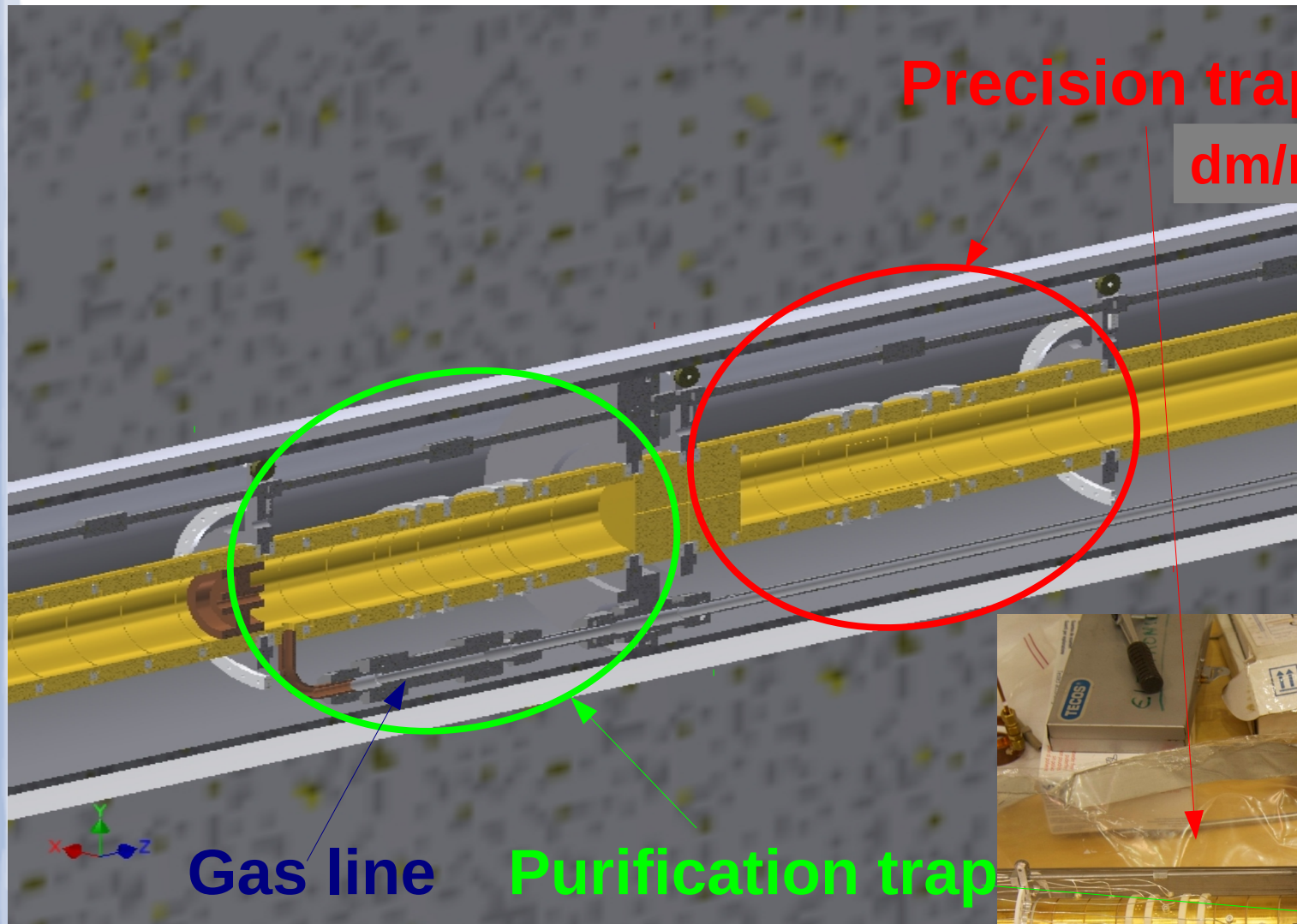
IGISOL Facility

JYFLTRAP





JYFLTRAP



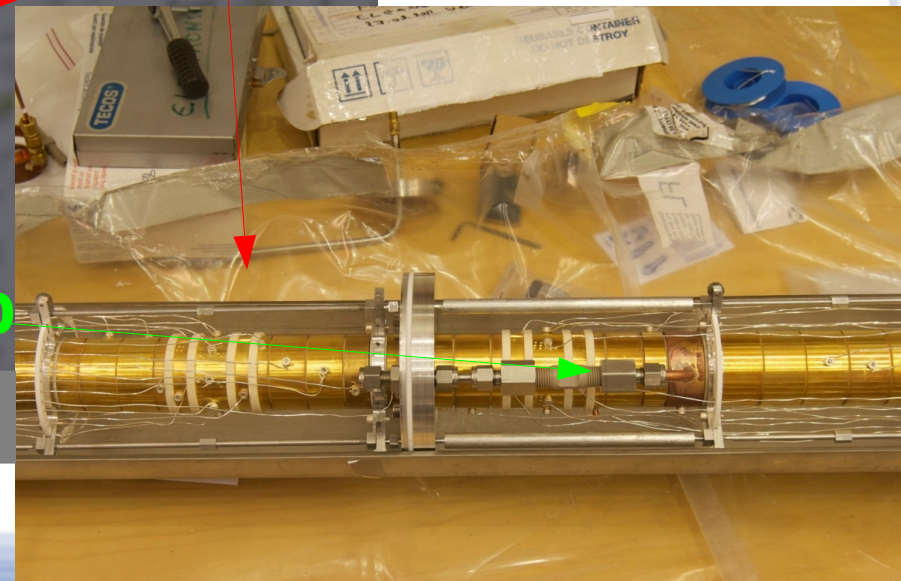
Precision trap

dm/m $\sim 10^{-6}$

Gas line

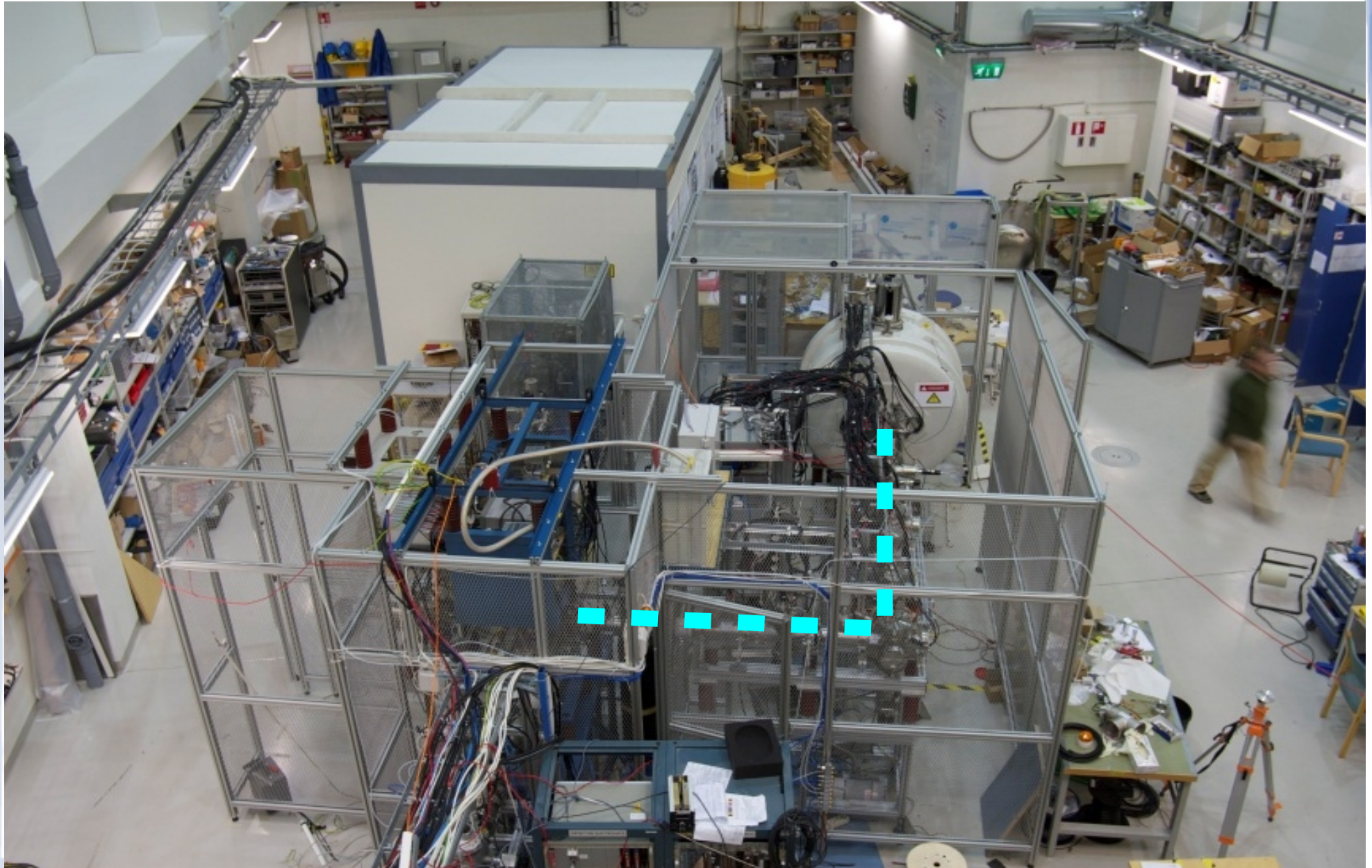
Purification trap

dm/m $\sim 10^{-5}$





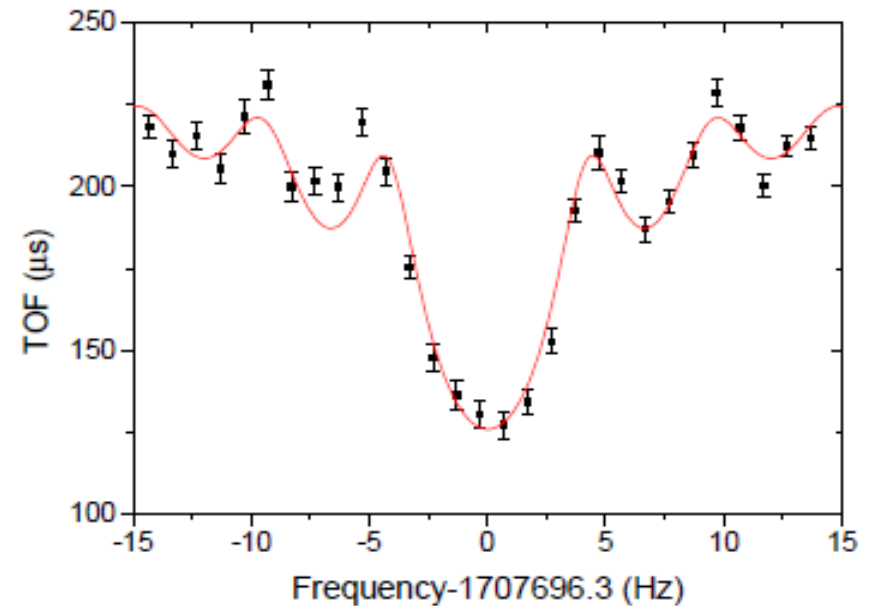
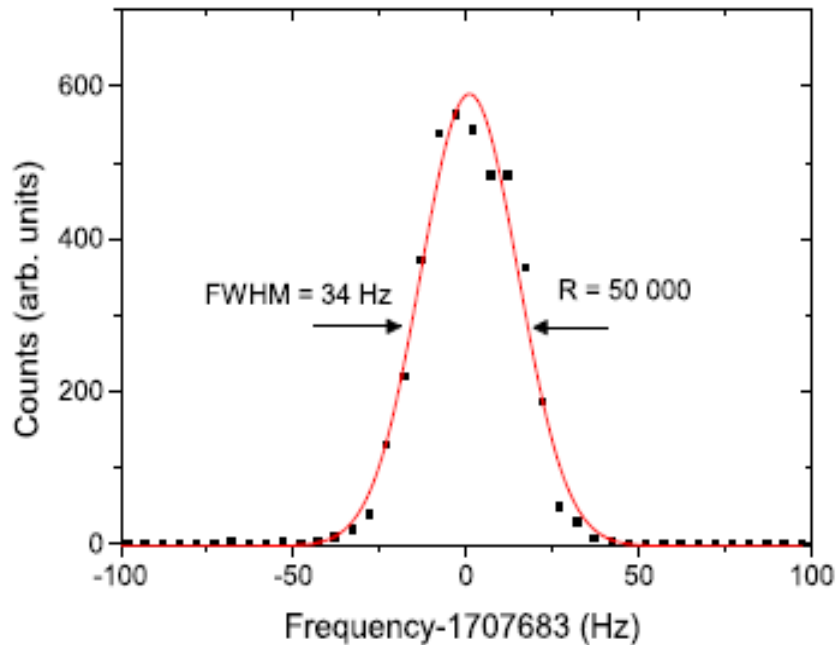
Off-line test and some difficulties





Off-line test and some difficulties

Frequency spectra of the ^{63}Cu ions produced by off-line spark source

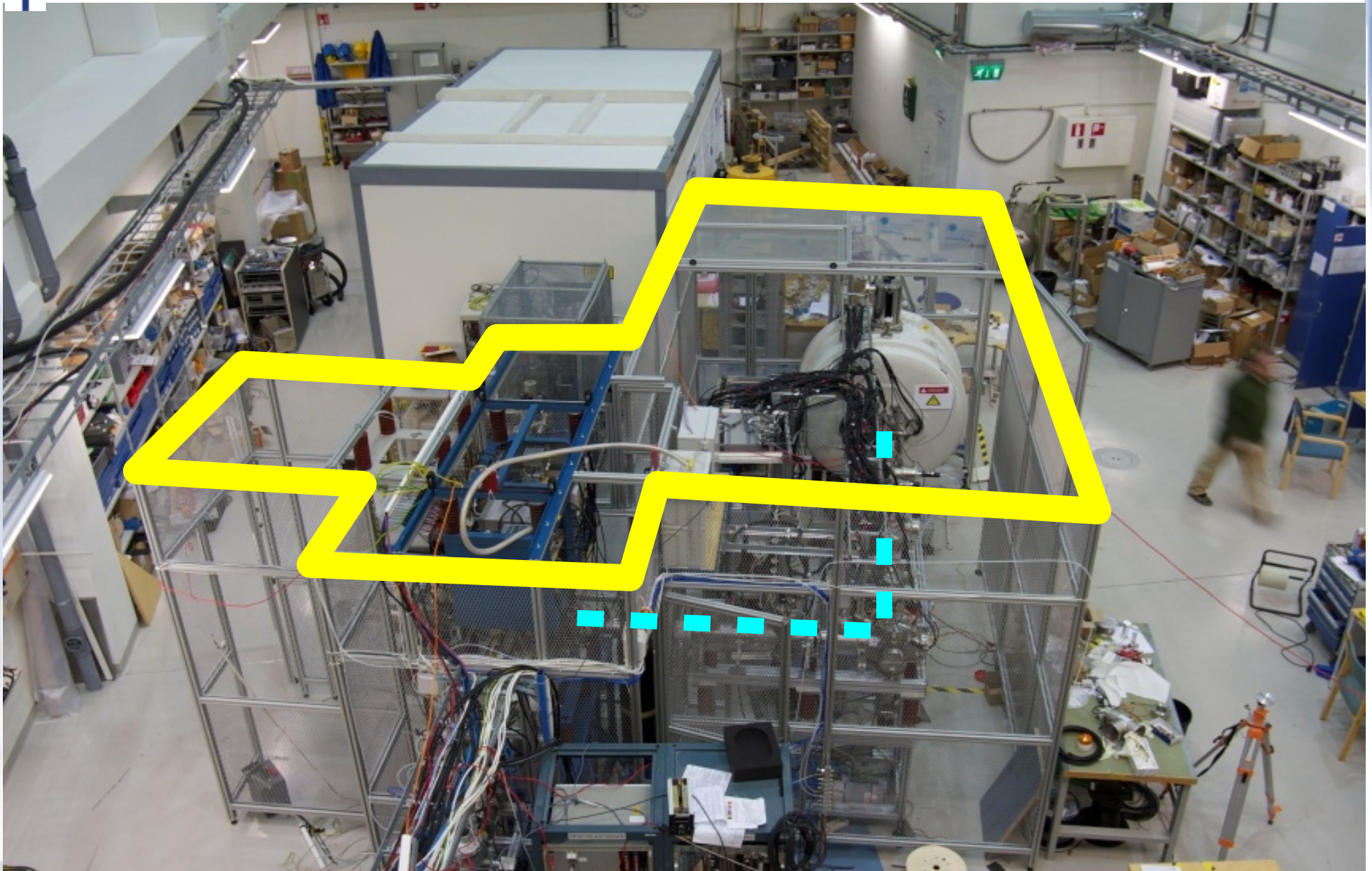


Time-of-Flight resonance for ^{63}Cu ions

Thanks to Veli Kolhinen and Andreas Solders

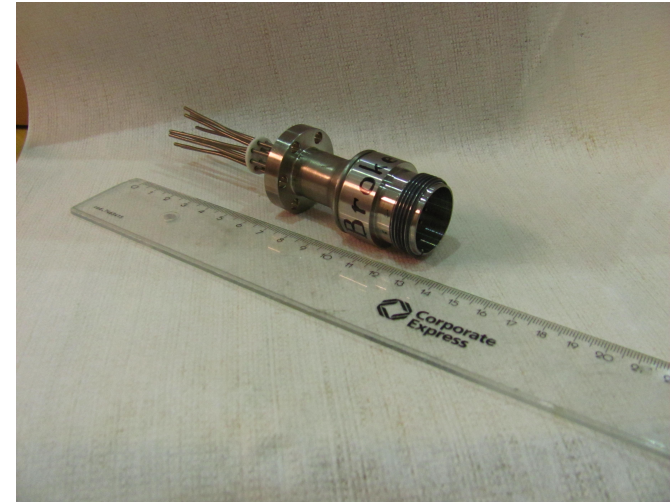
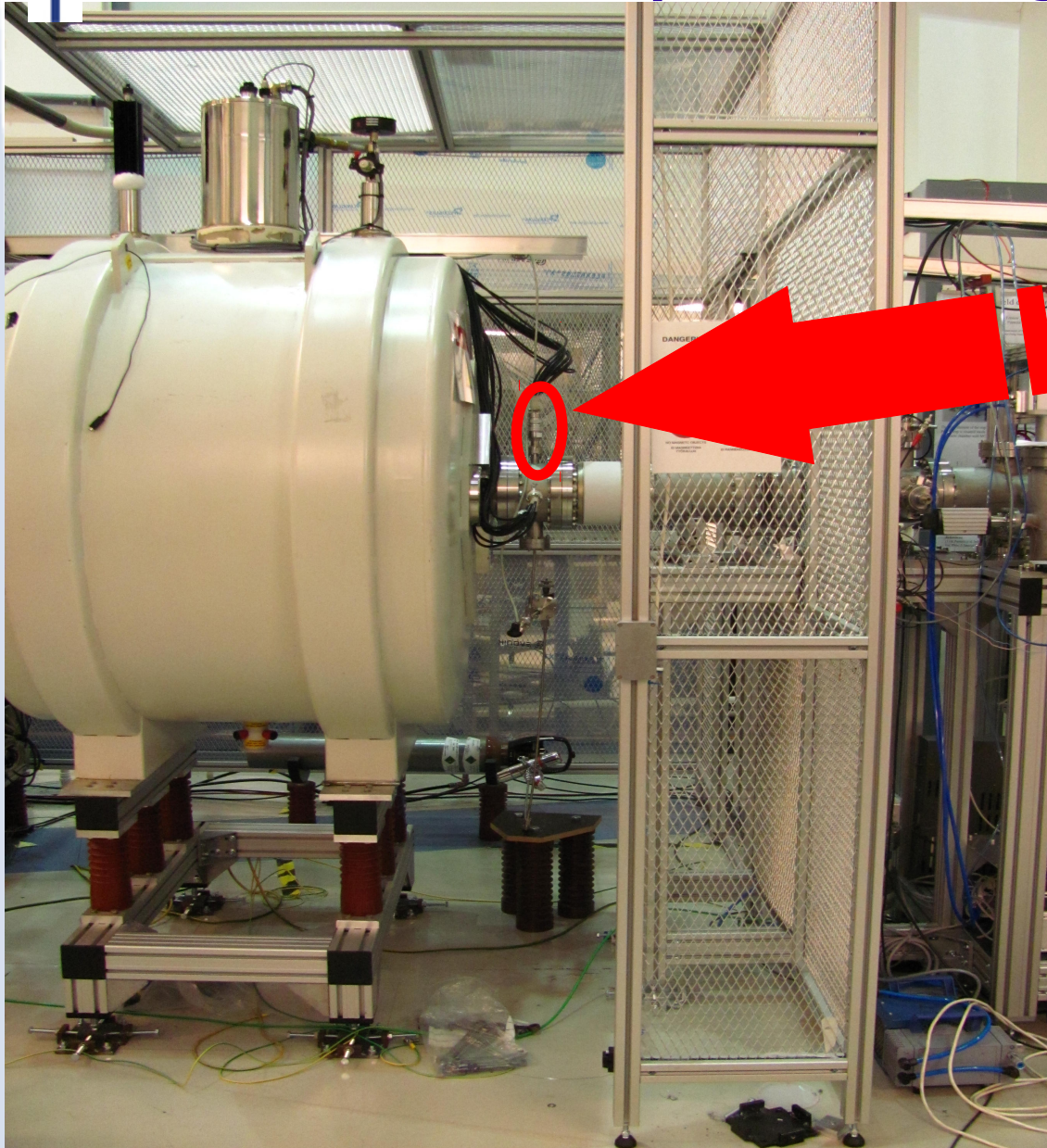


Off-line test and some difficulties





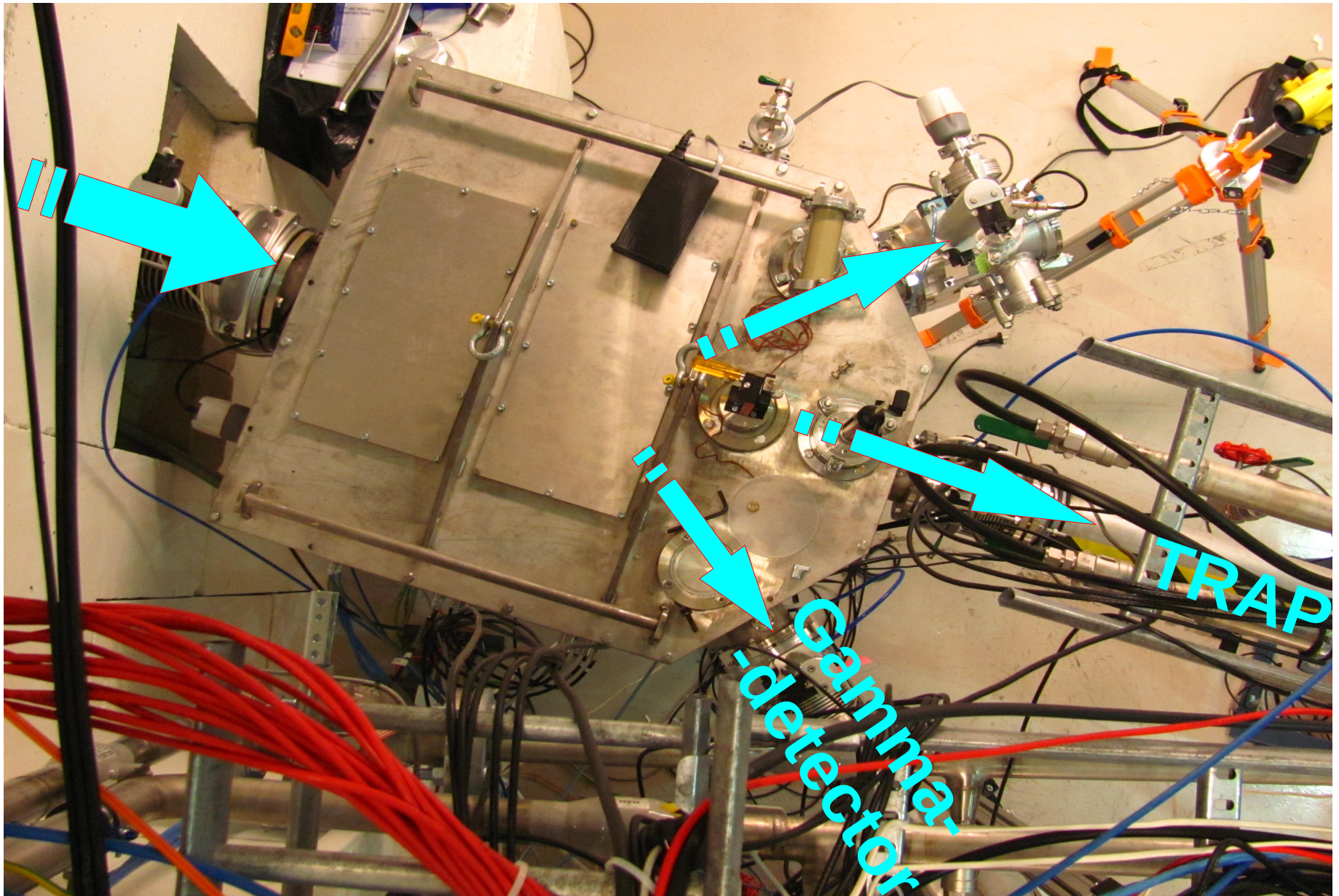
Small part – big problem



HV feedthrough was broken several days before experiment

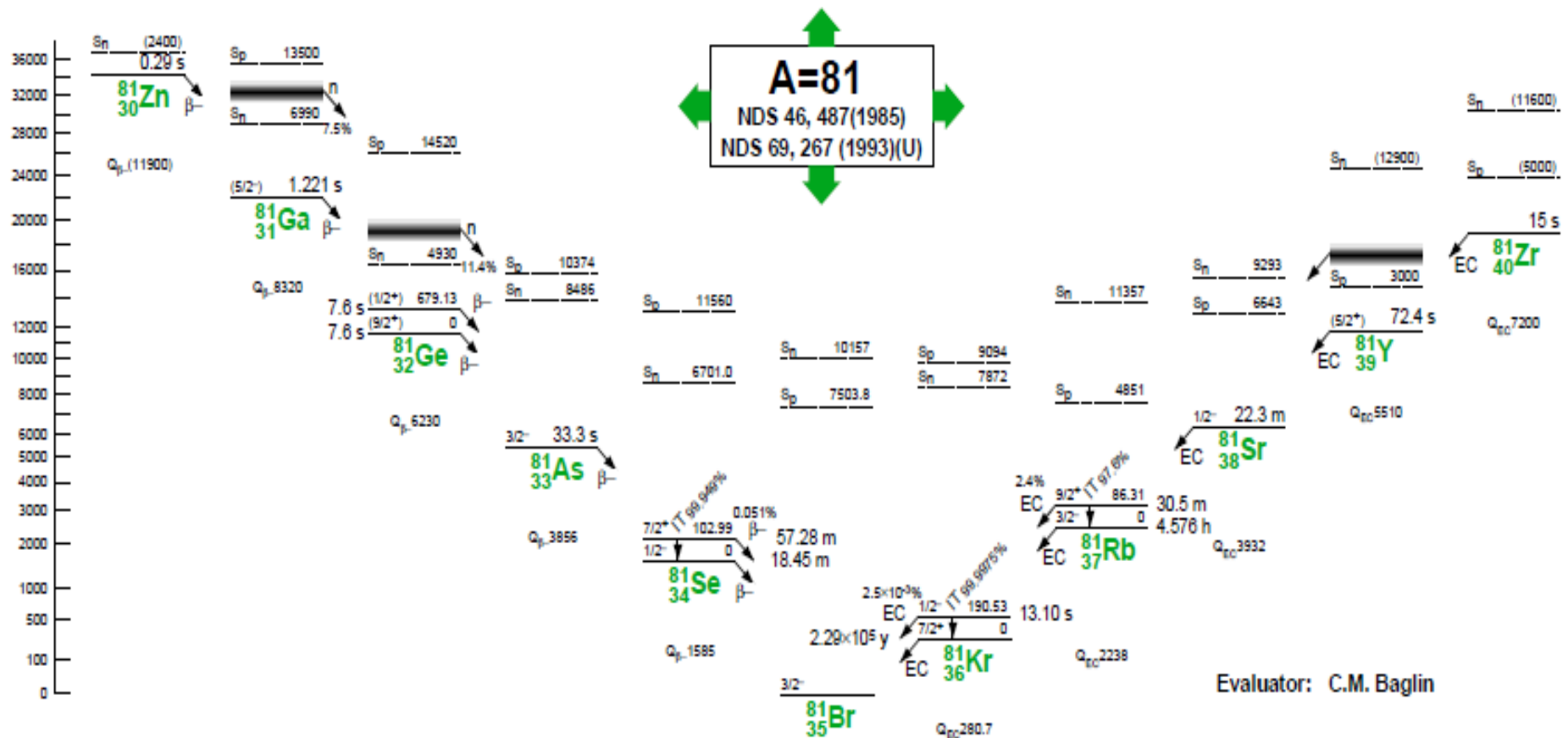


Gamma-detector instalation



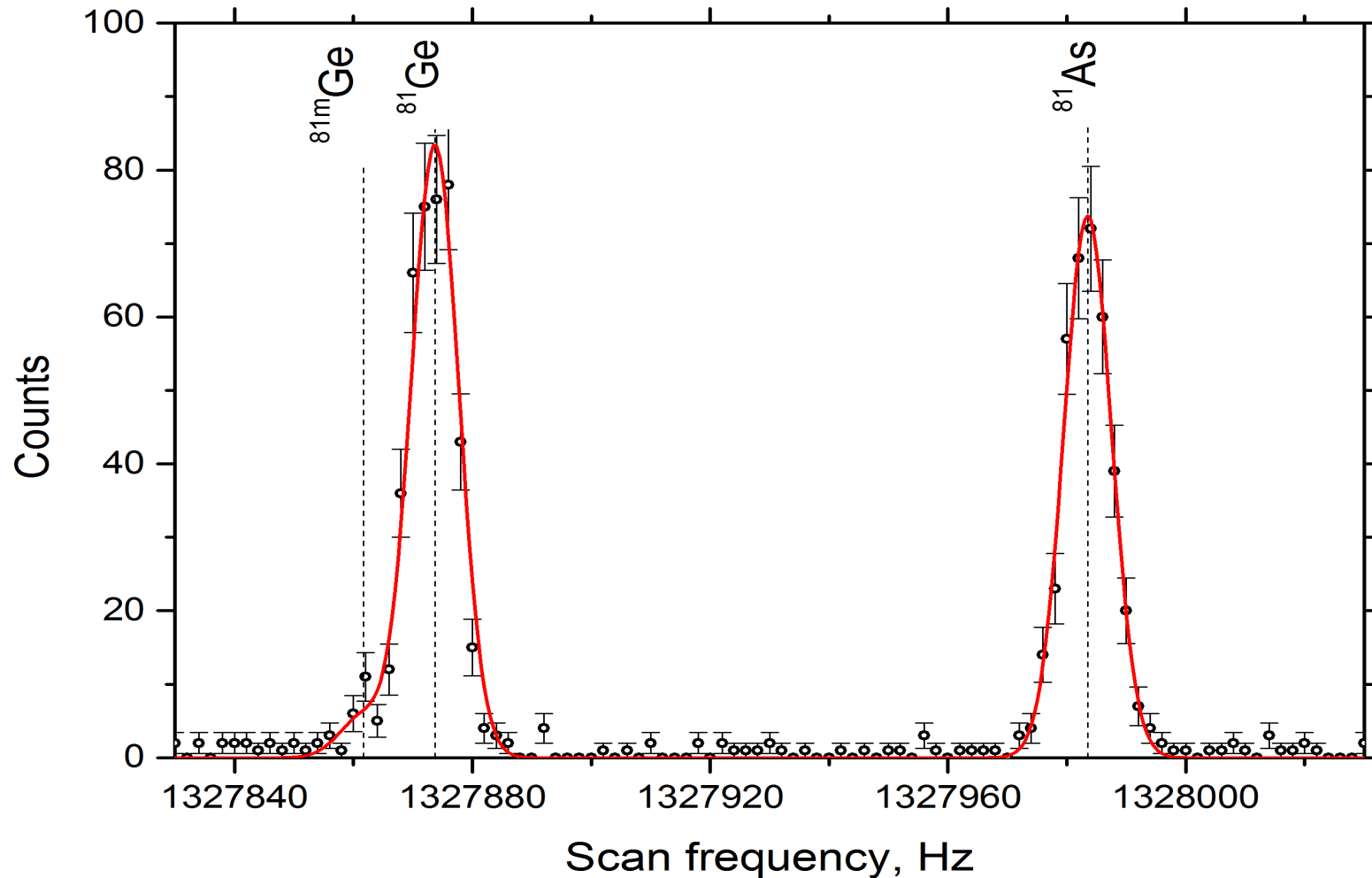


Decay scheme of isobaric chain A=81



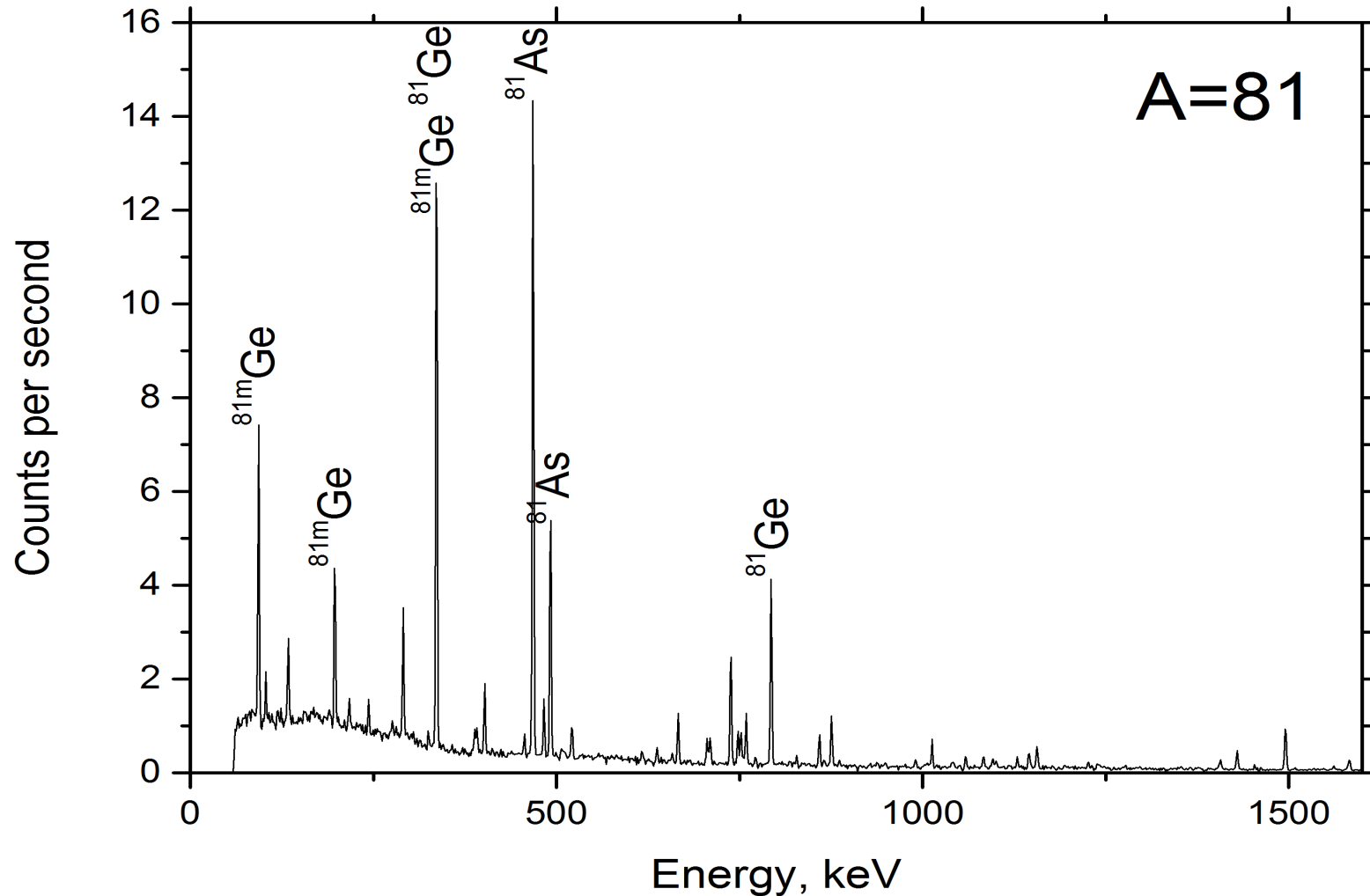


Frequency (mass) spectra of isobaric chain A=81



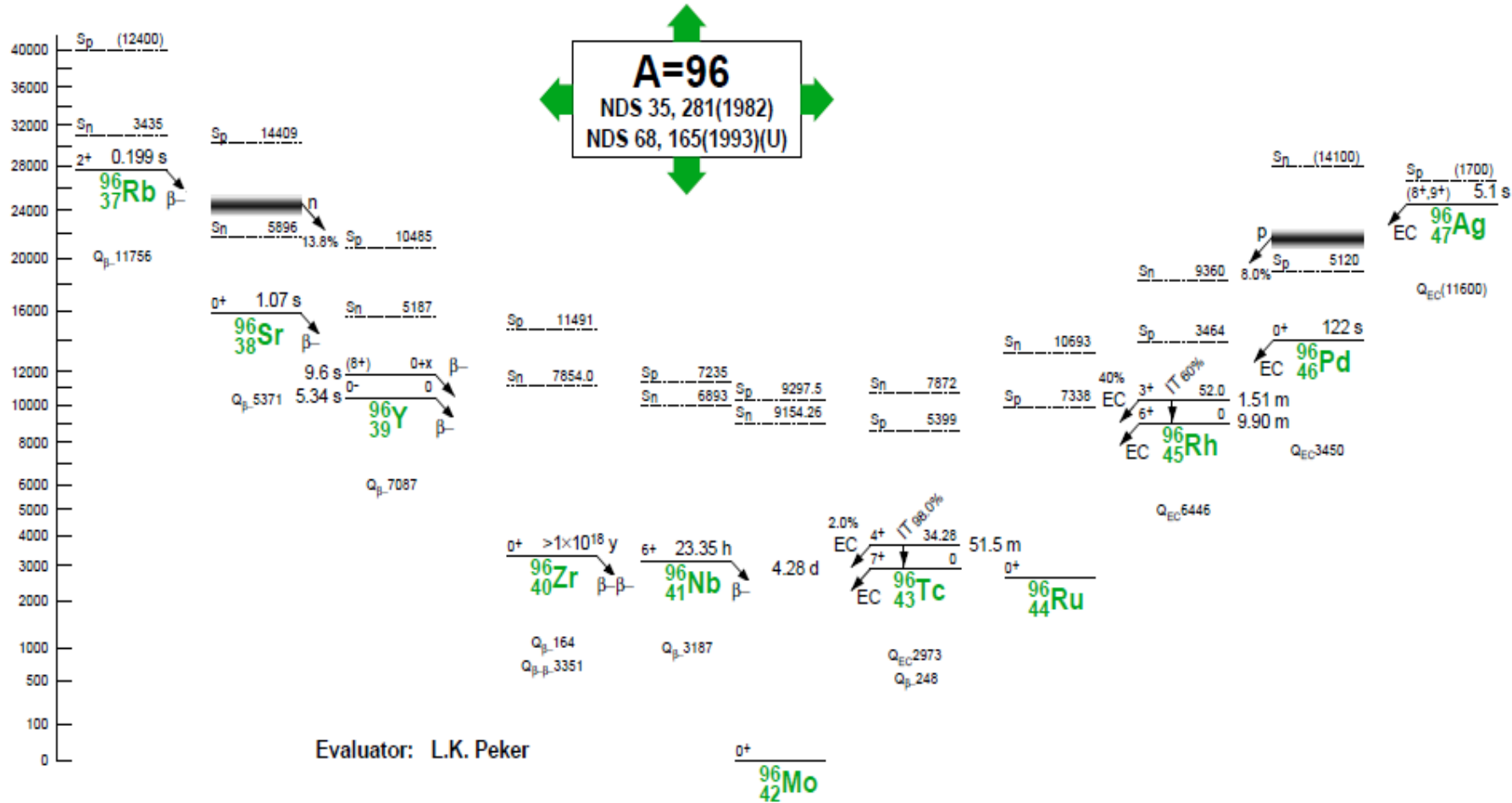


Gamma spectra of isobaric chain $A=81$



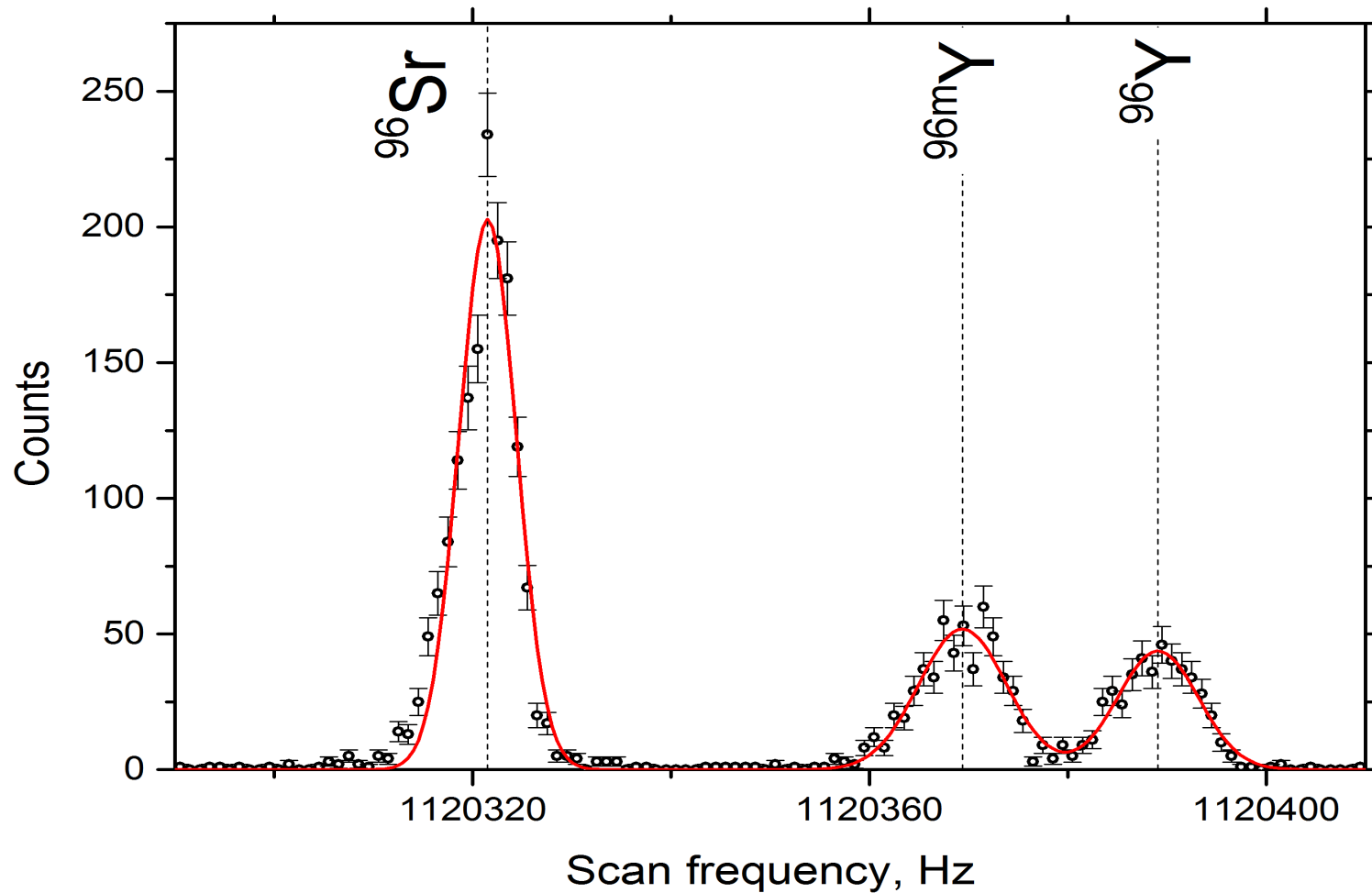


Decay scheme of isobaric chain A=96



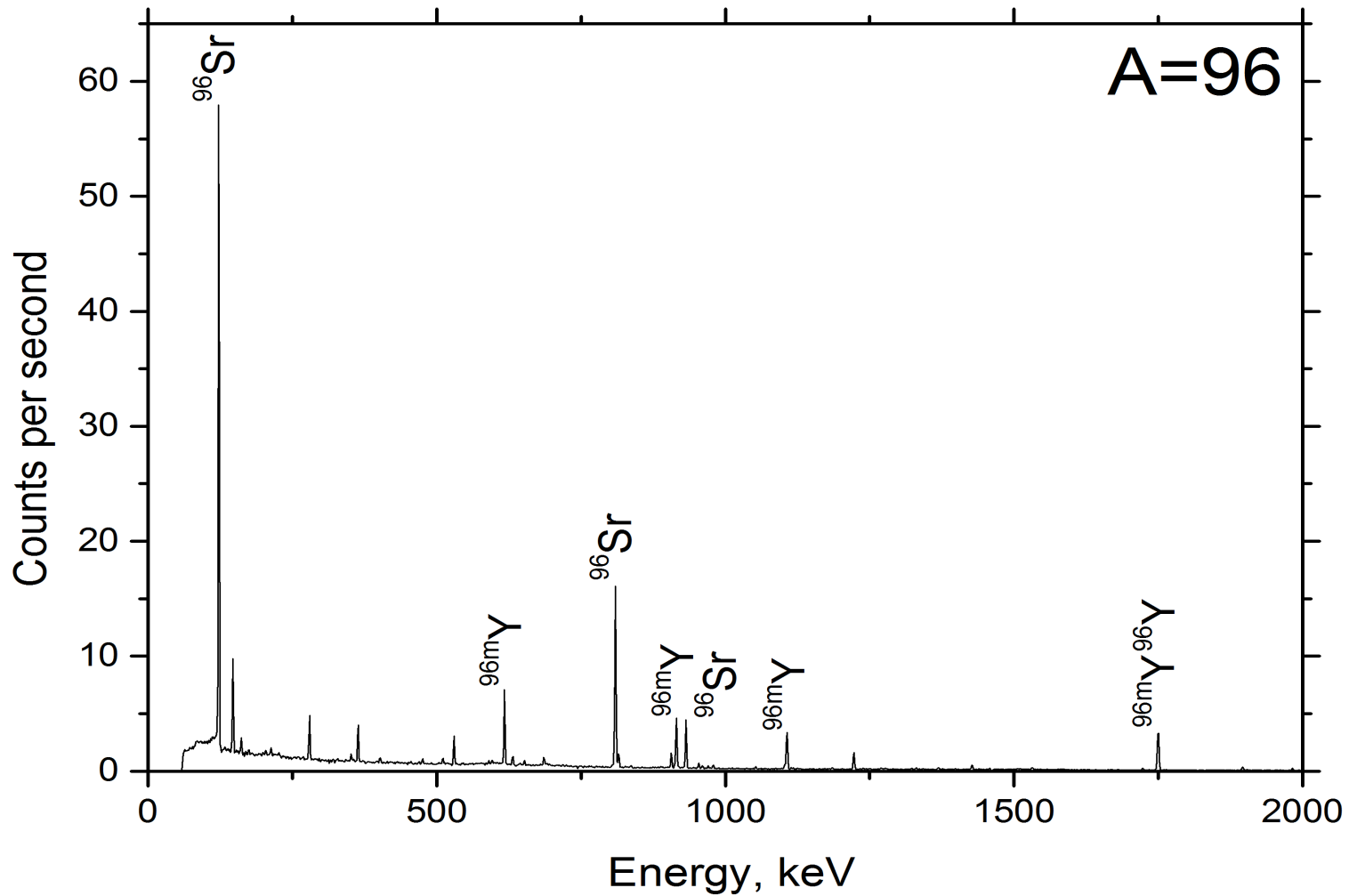


Frequency (mass) spectra of isobaric chain $A=96$



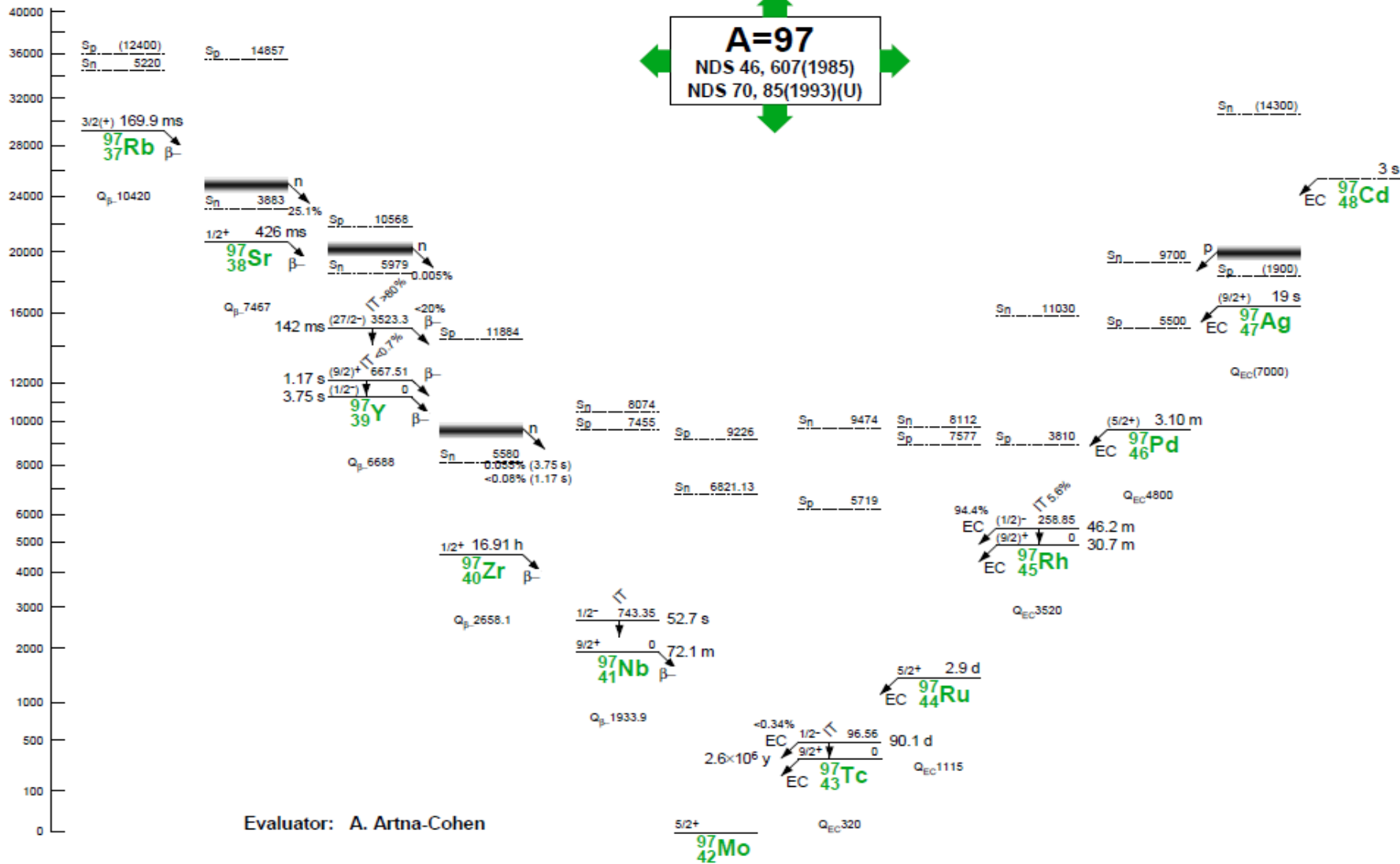


Gamma spectra of isobaric chain A=96



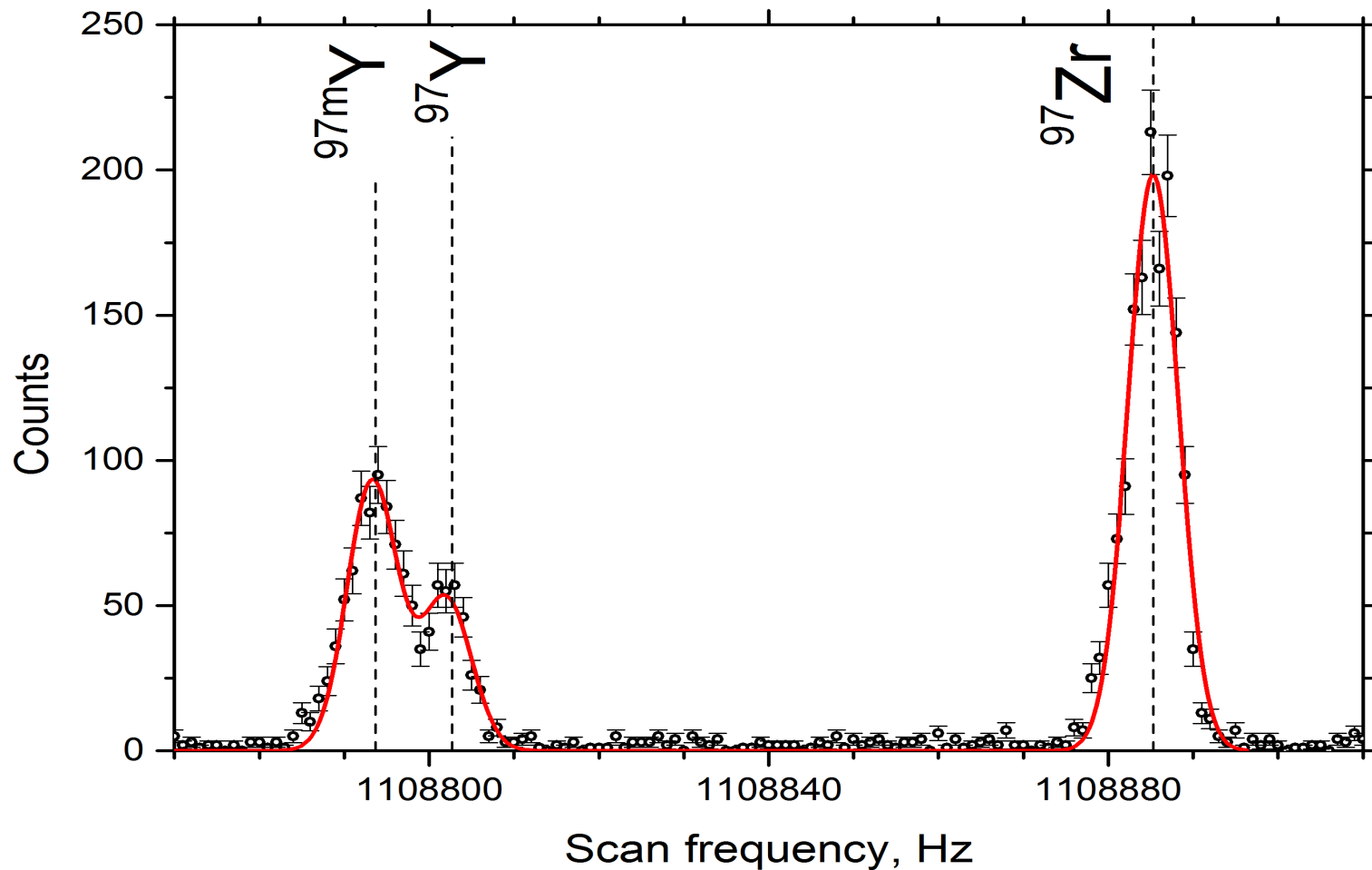


Decay scheme of isobaric chain A=97





Frequency (mass) spectra of isobaric chain $A=97$





Preliminary results

Isomeric pair	Trap measurement	Gamma spectroscopy	M.Tanikawa et al.
81Ge	$0.07 \pm (*)$	-	-----
96Y	$1.28 \pm (*)$	-	-----
97Y	$1.78 \pm (*)$	-	2.39 ± 0.36
128Sn	-	-	1.09 ± 0.07
130Sn	-	-	0.52 ± 0.02

M. Tanikawa et al, Z.Phys. A347, pp.53-62, 1993.



Collaboration

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