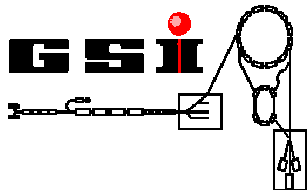
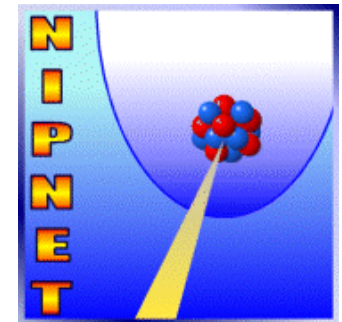


# ISOLTRAP Status Report

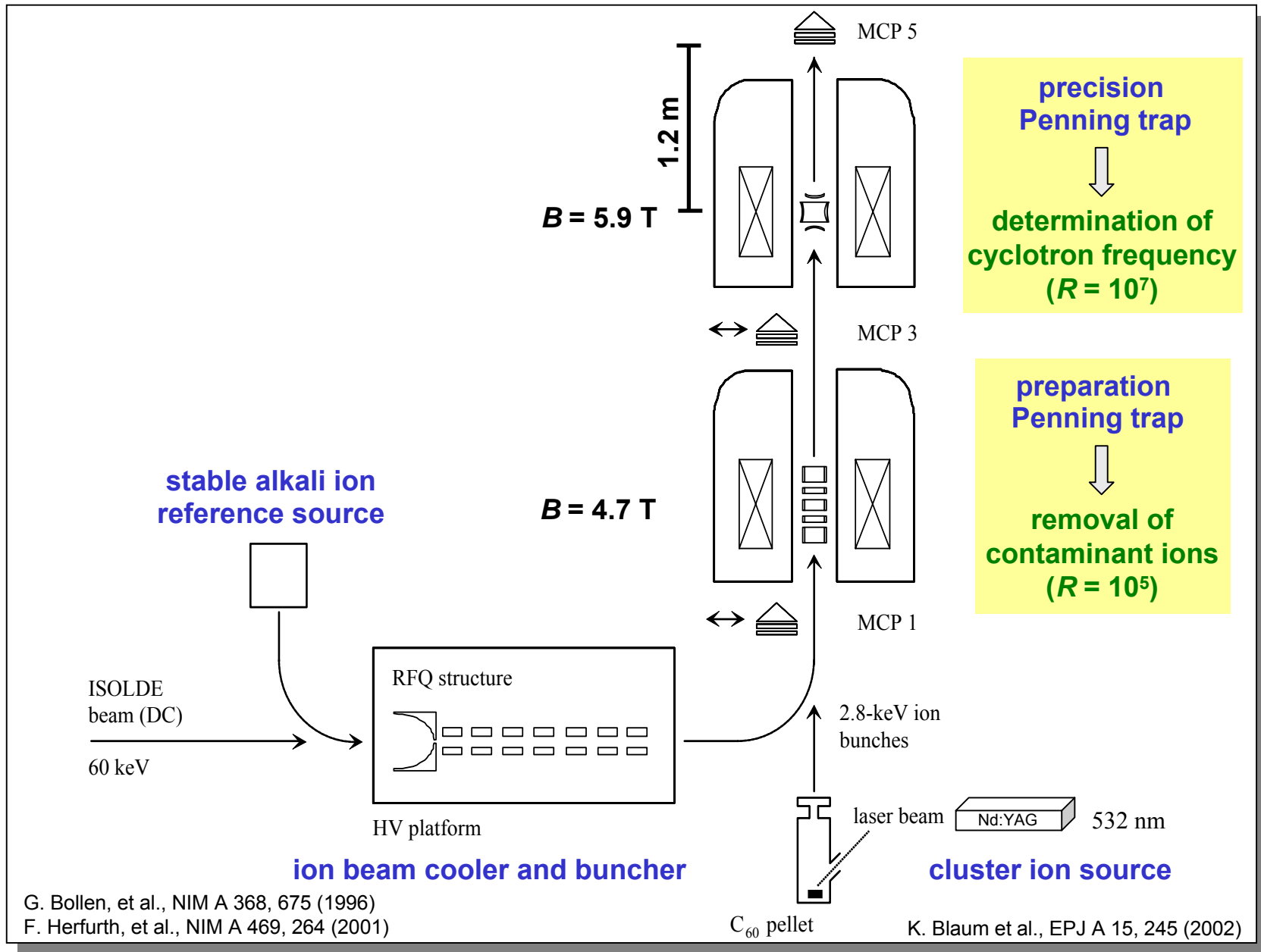
**Klaus Blaum for the ISOLTRAP Collaboration  
University of Mainz and GSI Darmstadt**

## Outline

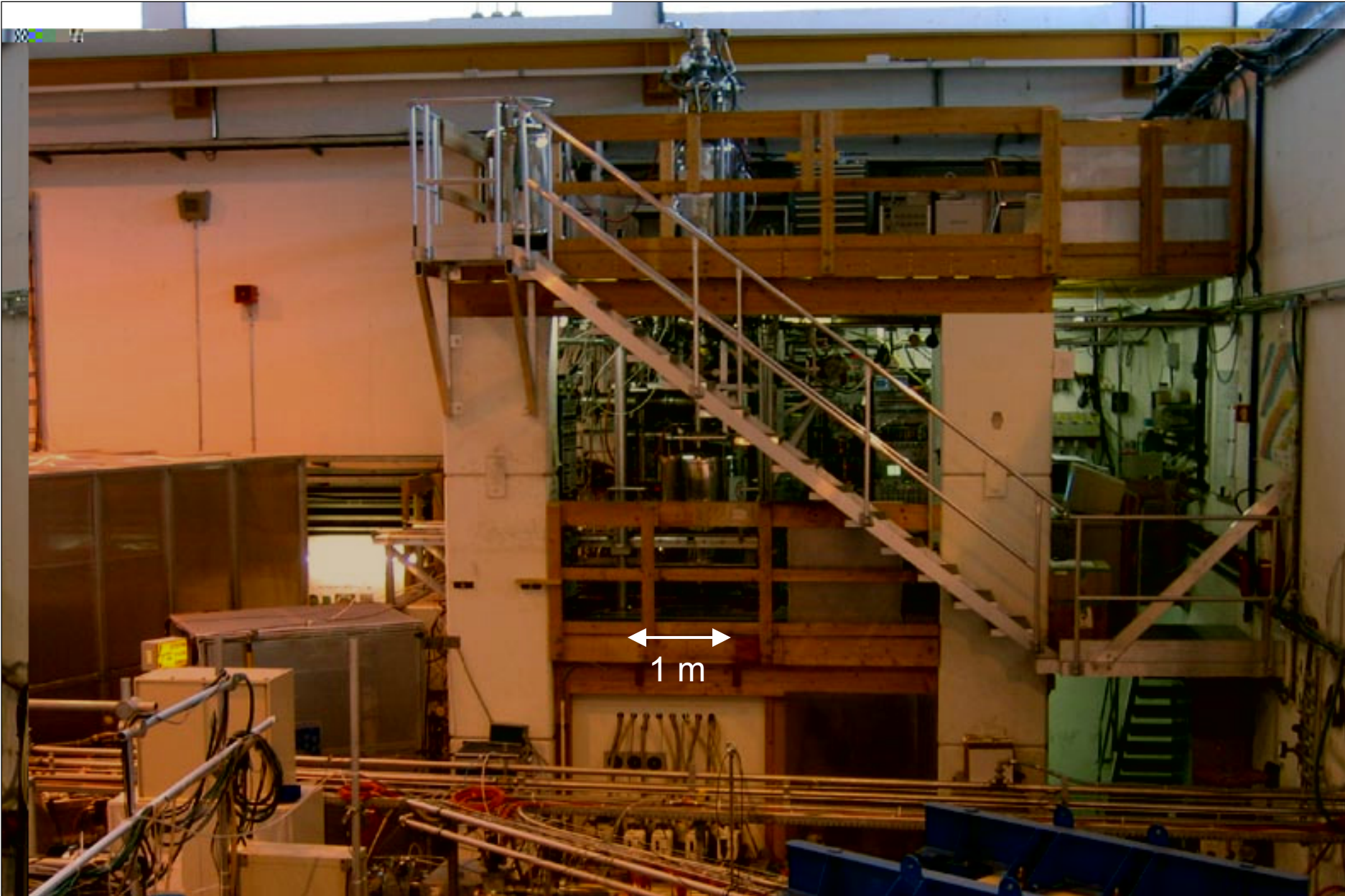
- Experimental setup
- Recent experimental highlights
- Future measurement program



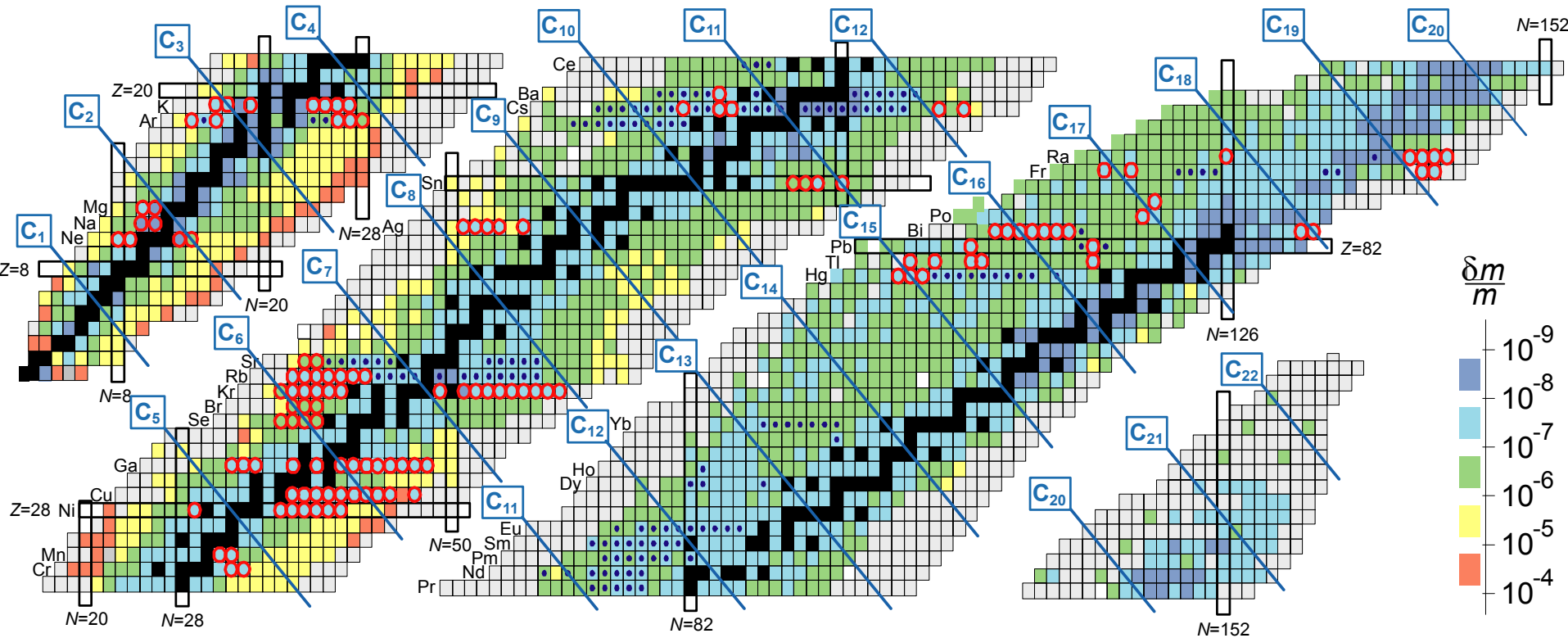
# Triple-Trap Mass Spectrometer ISOLTRAP



# ISOLTRAP Setup



# Measured ISOLTRAP masses

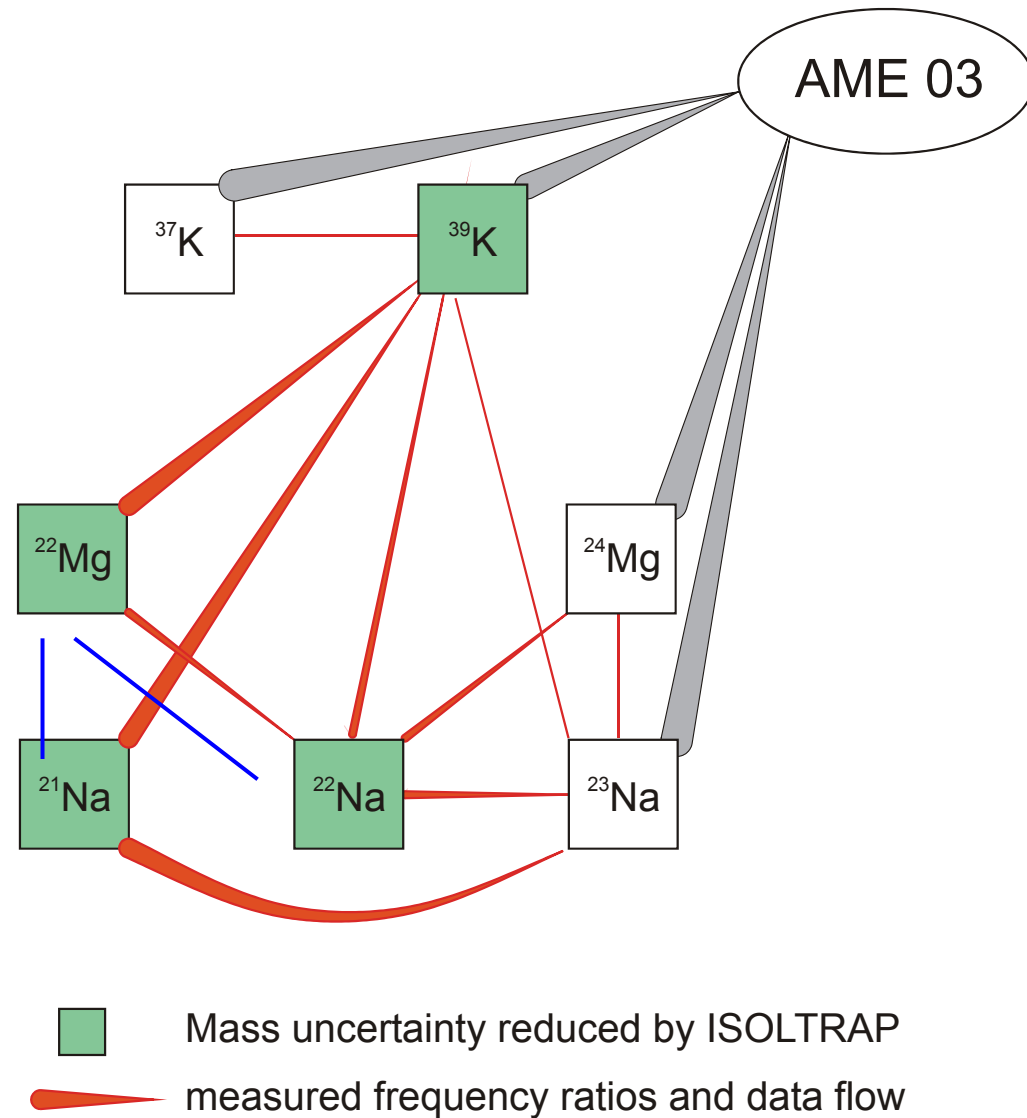
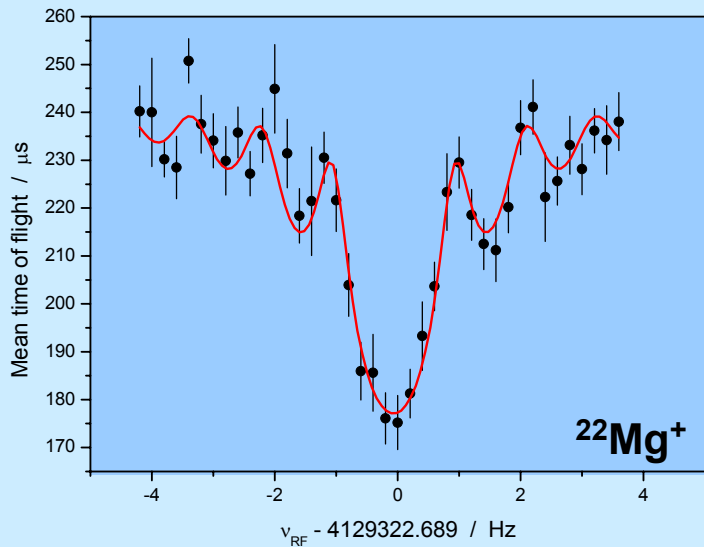


Masses measured with ISOLTRAP

- before 2002 (142 masses)
- since 2002 (131 masses)

# The mass of $^{22}\text{Mg}$

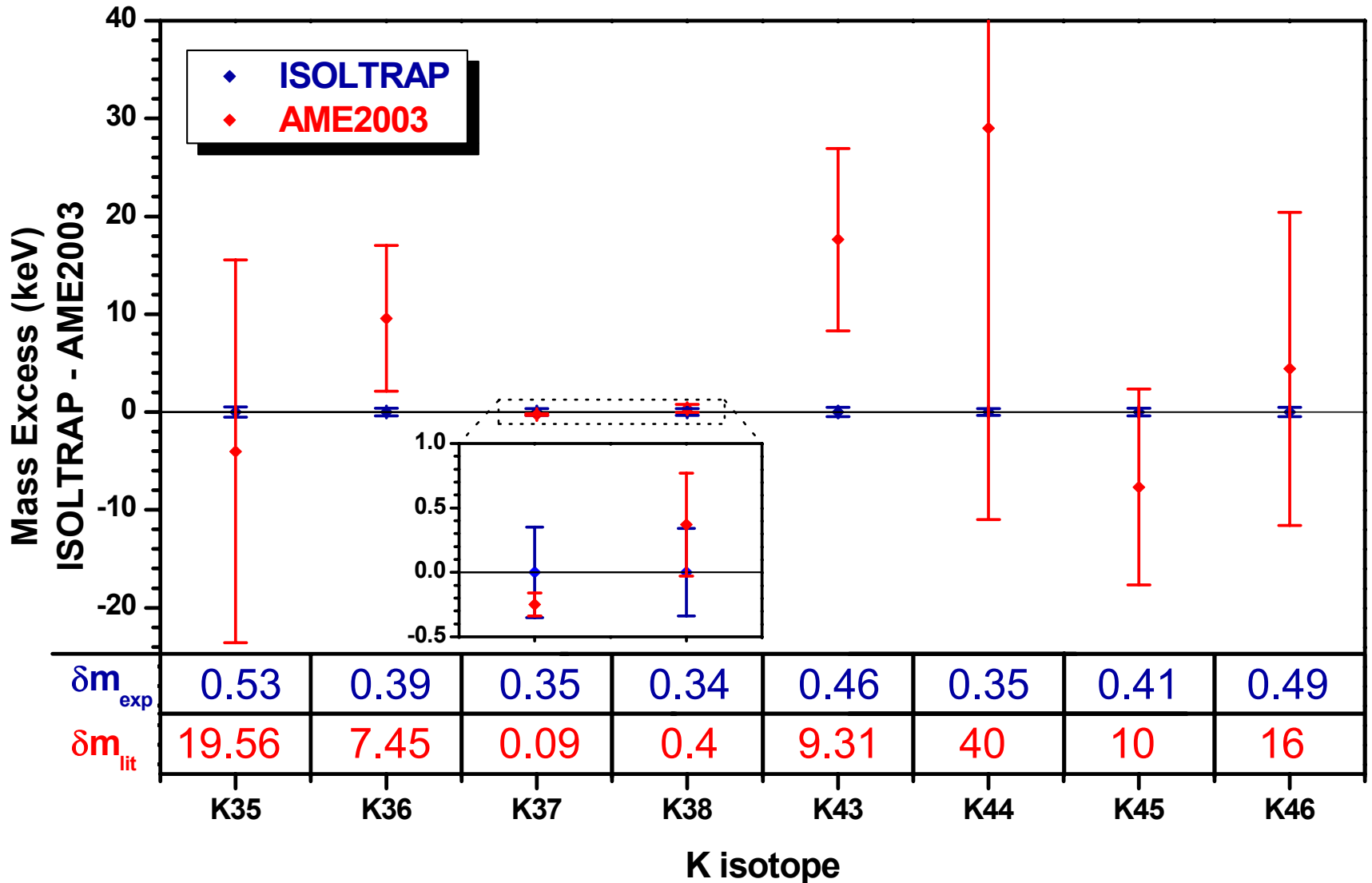
- 10 frequency ratios meas.
- 16 relations included in  $\chi^2$  adjustment





# Test of the IMME in the $T=3/2$ , $A=35$ system

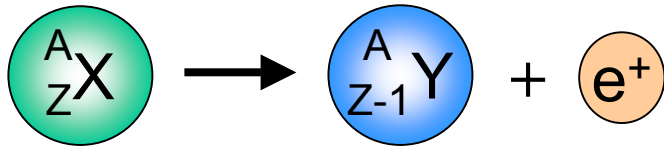
Final data evaluation not yet finished!



# A Novel Idea: In-Trap Decay Mass Spectrometry

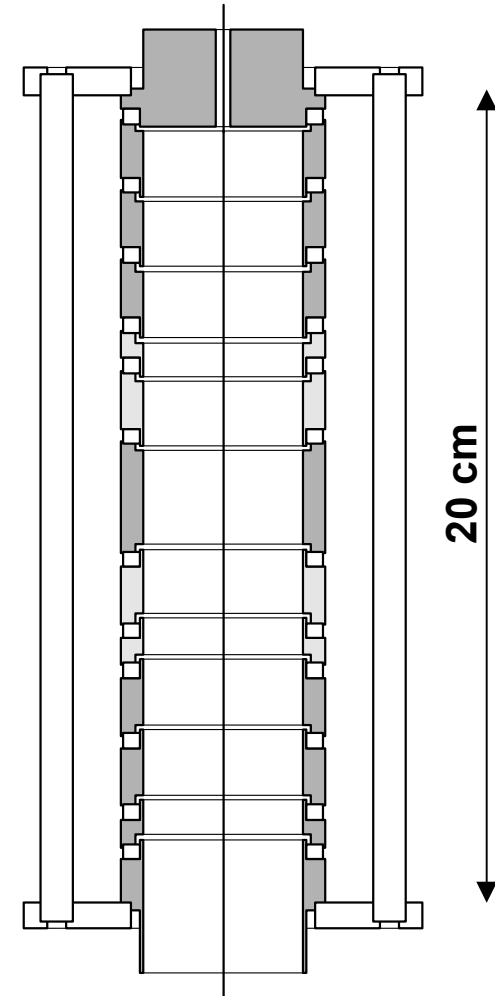
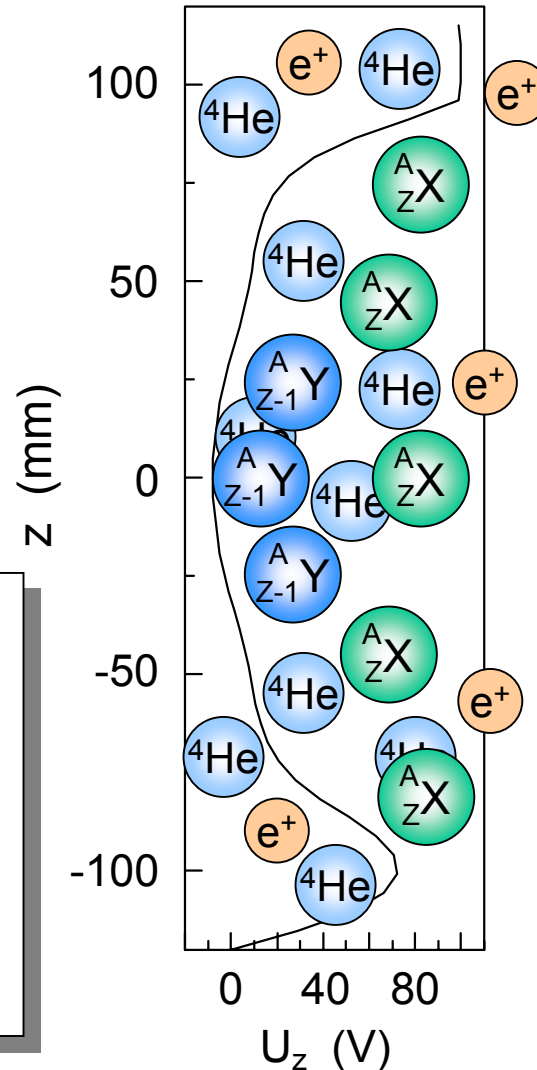
## Decay in the buffer-gas-filled preparation trap

produced  
at ISOLDE



not produced  
at ISOLDE

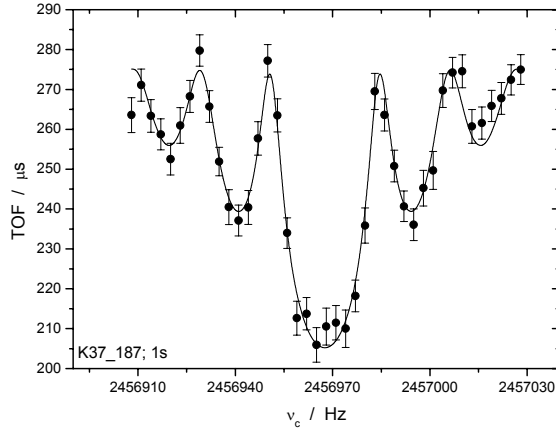
- **Make more radioactive species available**
- **Nearly simultaneous  $\omega_c$  measurement of mother and daughter nuclei**
- **Test candidate:  $^{37}\text{K} \rightarrow ^{37}\text{Ar}$**



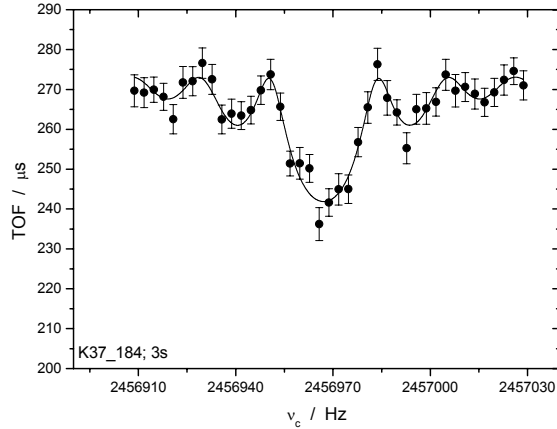
# In-Trap Decay Results

**$^{37}\text{K}^+$**

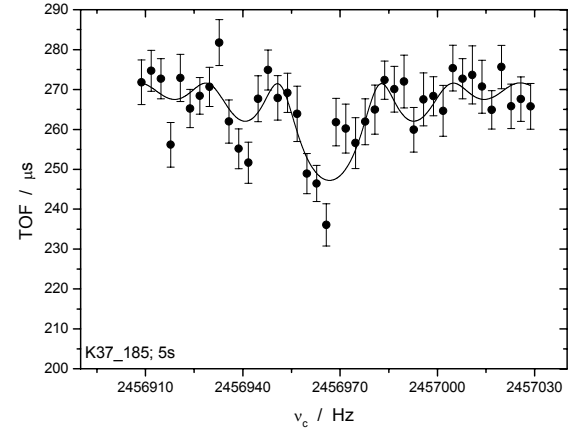
1 s waiting time



3 s waiting time

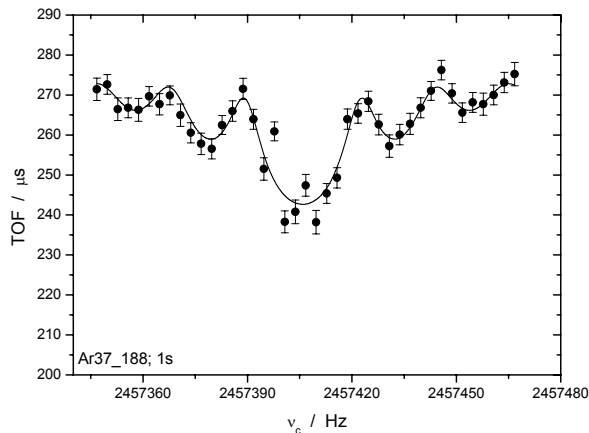


5 s waiting time

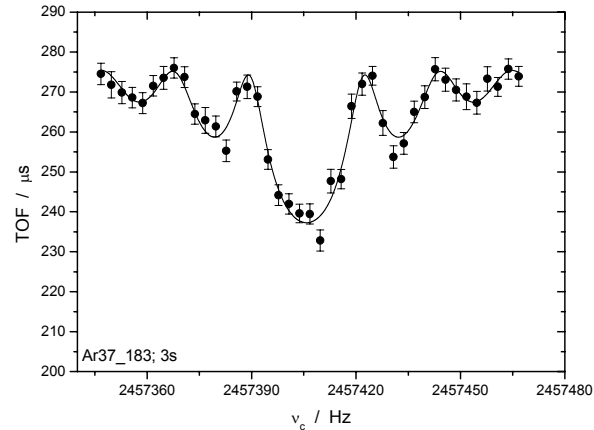


**$^{37}\text{Ar}^+$**

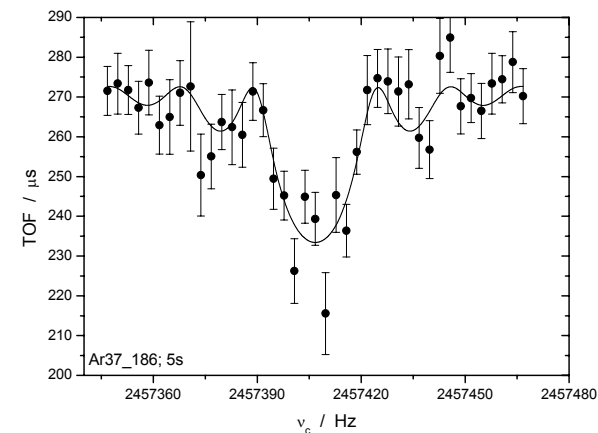
1 s waiting time



3 s waiting time



5 s waiting time

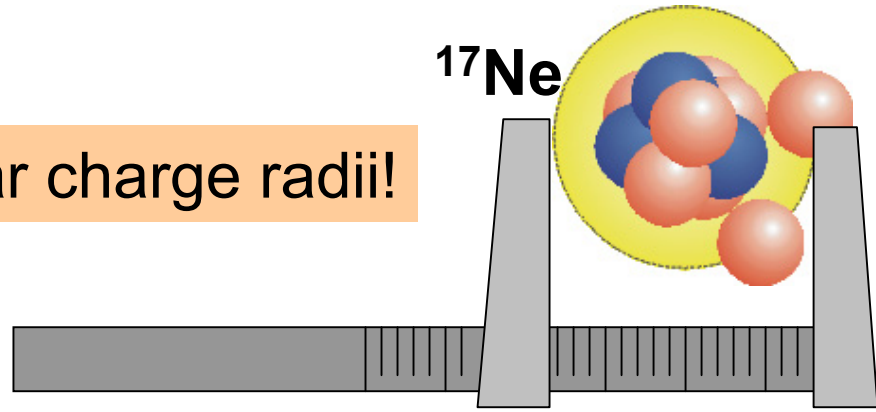


Elements/isotopes which are in principle not produced are accessible!

# The mass of $^{17}\text{Ne}$

How to probe if  $^{17}\text{Ne}$  is a proton halo?

Via the nuclear charge radii!



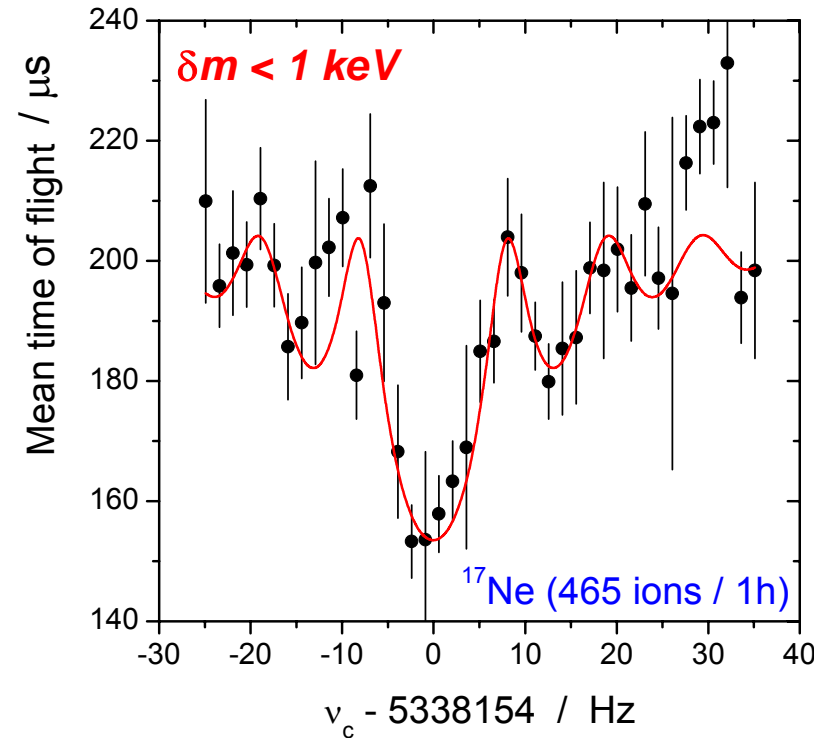
$T_{1/2} = 109 \text{ ms}$   
Yield = 1000/s

## Isotope-shift measurements:

$$\delta v_{IS}^{A,A'} = (K_{NMS} + K_{SMS}) * \frac{M_{A'} - M_A}{M_{A'} M_A} + F_{el.} * \delta \langle r^2 \rangle^{A'A}$$

$\delta \langle r^2 \rangle^{A'A} \Rightarrow$  **nuclear charge radii**

Mass uncertainty of  $\delta m / m \approx 1 \cdot 10^{-7}$   
(~ 2 keV) required!



- new high-precision measurements on a large number of nuclei
- smallest mass uncertainty: 160 eV ( $^{22}\text{Na}$ )
- impact on many aspects of physics by mass measurements of  $^{22}\text{Mg}$ ,  $^{35}\text{K}$ ,  $^{70}\text{Zn}$

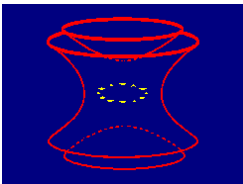
# Not to Forget ...

## Thanks to my co-workers:

G. Audi, G. Bollen, D. Beck, P. Delahaye, C. Guénaut, A. Herlert, F. Herfurth, A. Kellerbauer, H.-J. Kluge, D. Lunney, D. Rodríguez, C. Scheidenberger, S. Schwarz, L. Schweikhard, C. Weber, C. Yazidjian ..., and the ISOLTRAP and ISOLDE collaboration

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Thanks a lot for  
your attention.

