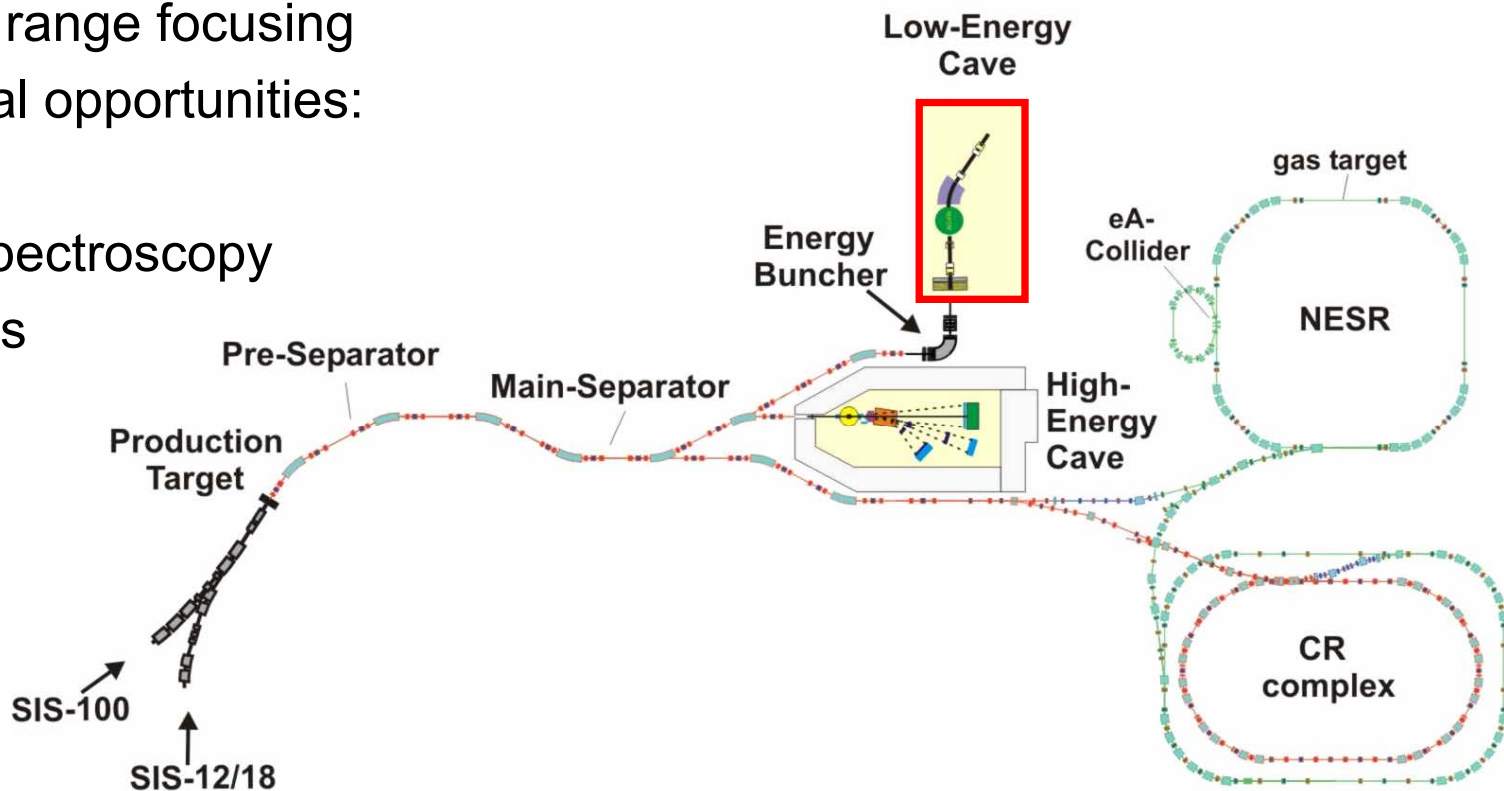


Precision Experiments and Photon Spectroscopy at the Super FRS

Magdalena Górska

Polish-German Meeting, Warsaw, November 24, 2003

- Motivation for the LEB
- Energy and range focusing
- Experimental opportunities:
 - Agata
 - Laser Spectroscopy
 - Ion Traps

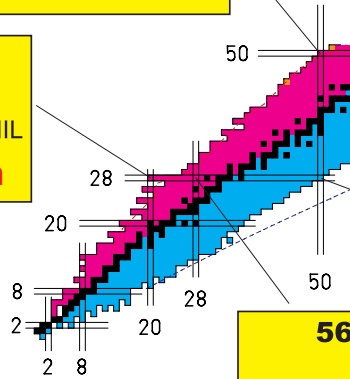


Motivation for the LEB

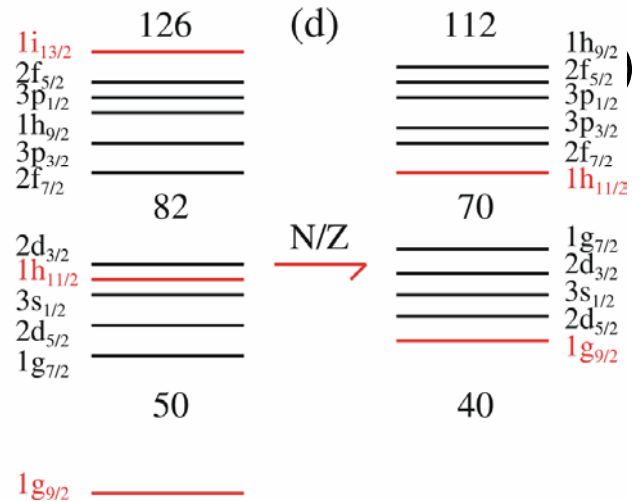
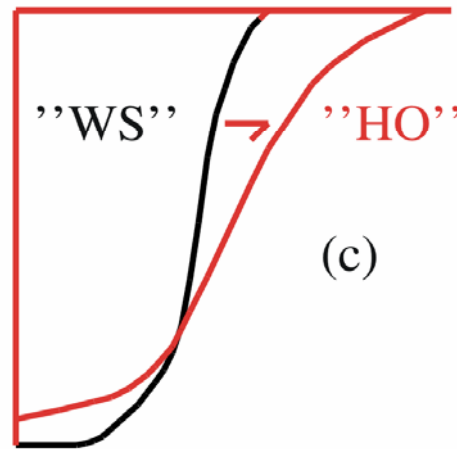
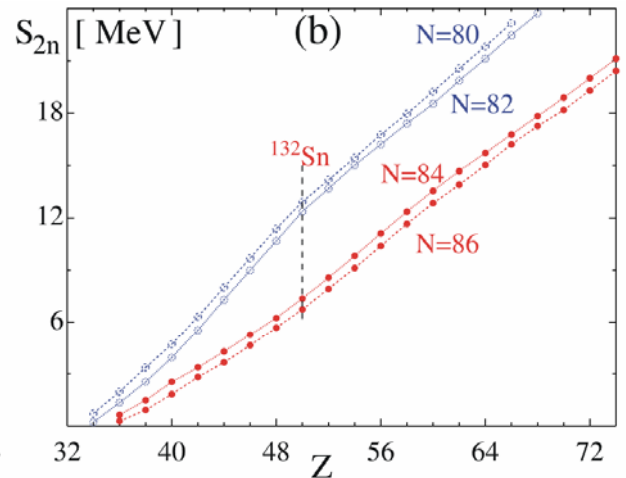
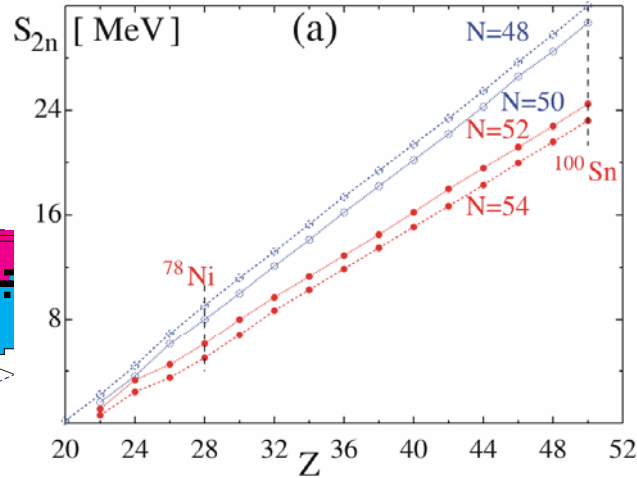
(Low energy high-quality beams, complementary to ISOL)

^{100}Sn
7 atoms in 280 h
SIS 200: 2/s

^{48}Ni
Discovered at GANIL
SIS 200: 65/h



56
SIS 200



T.R. Werner, J. Dobaczewski, W. Nazarewicz,
Z. Phys. A358 (1997) 169

Opportunities at the LEB

Energy Buncher:

$$B\rho_{\text{Max}} = 10 \text{ Tm}$$

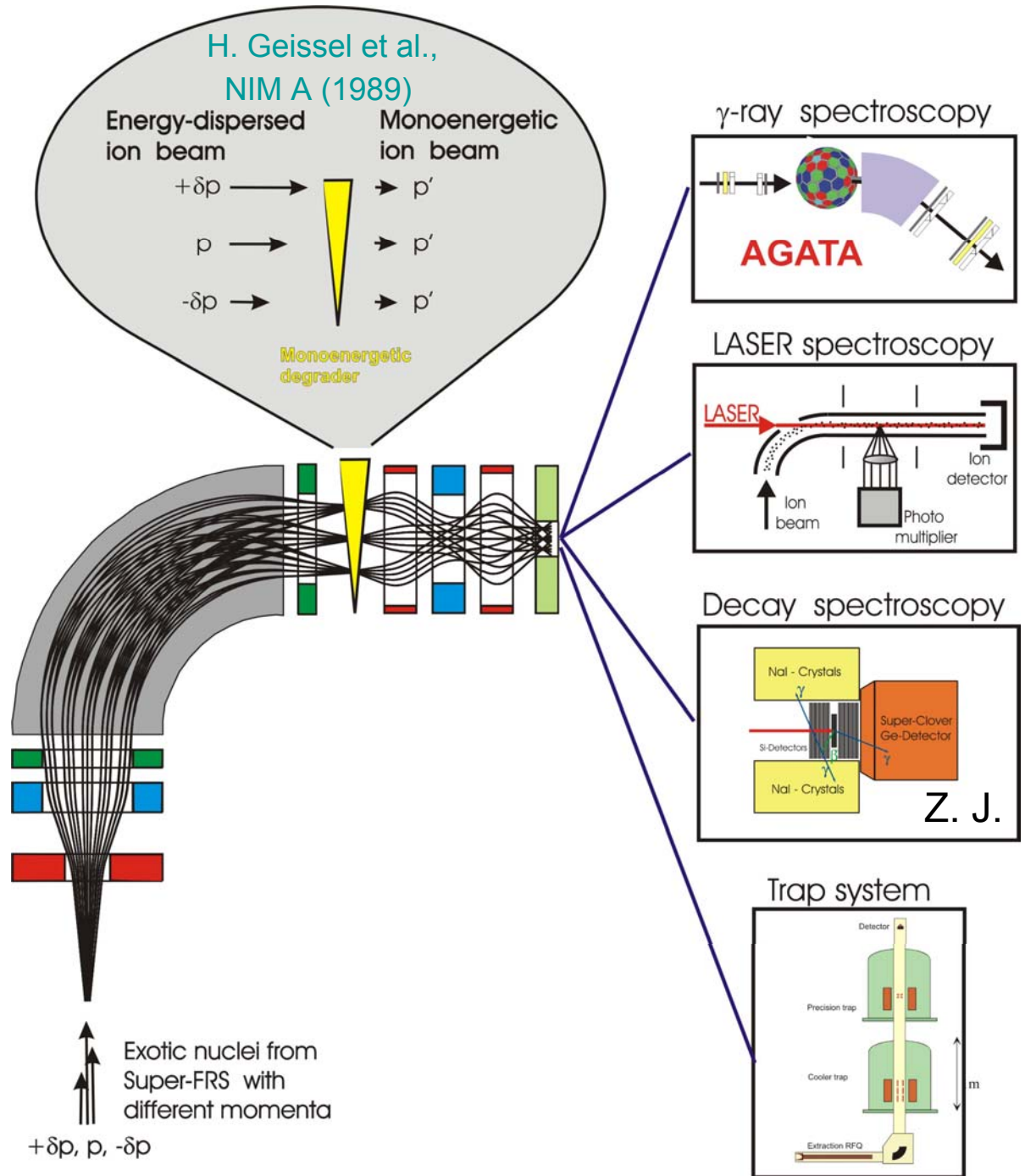
$$\varepsilon_x = \pm 300 \pi \text{ mm mrad}$$

$$\varepsilon_y = \pm 200 \pi \text{ mm mrad}$$

$$\Delta p/p_{\text{acc}} = \pm 2.5\%$$

$$\text{Ion optical } R = 600$$

C. Scheidenberger

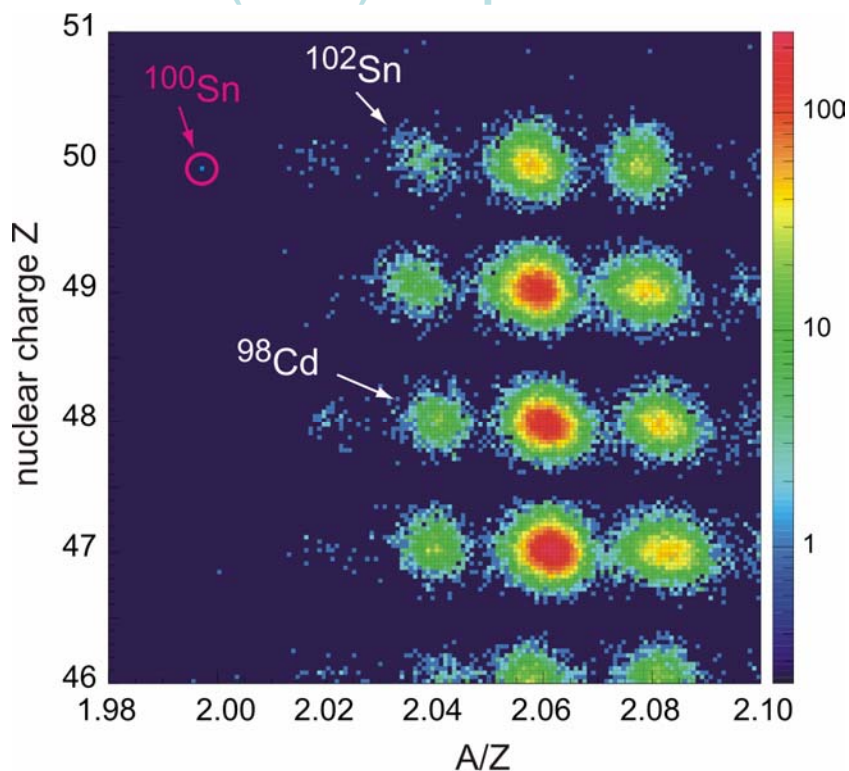


Single-atom spectroscopy

Identification of the Doubly Magic ^{100}Sn

^{100}Sn

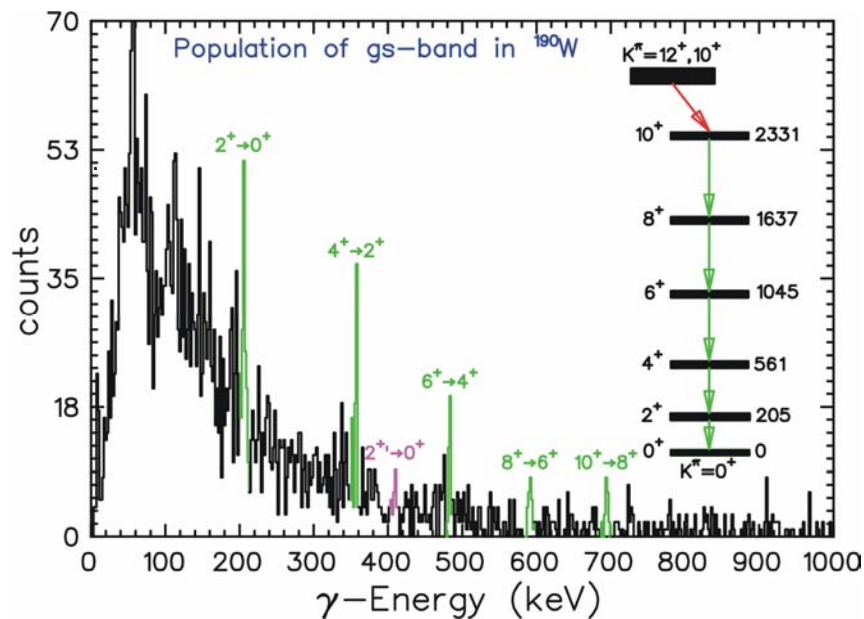
$\sigma(^{100}\text{Sn})=1.8 \text{ pb}$



A. Stolz (TUM)

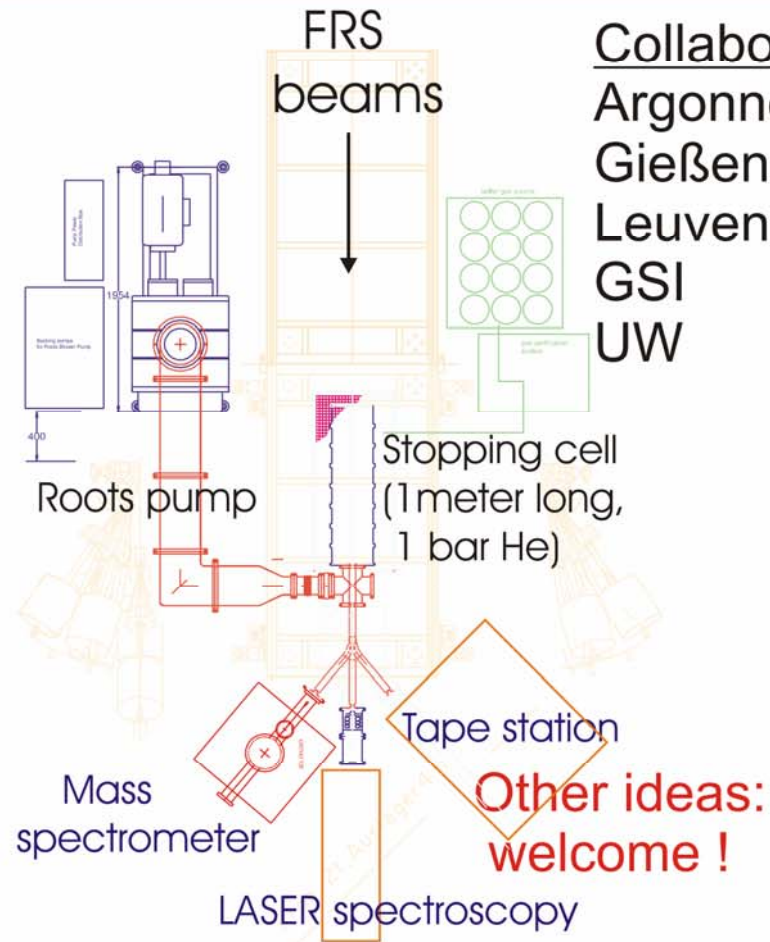
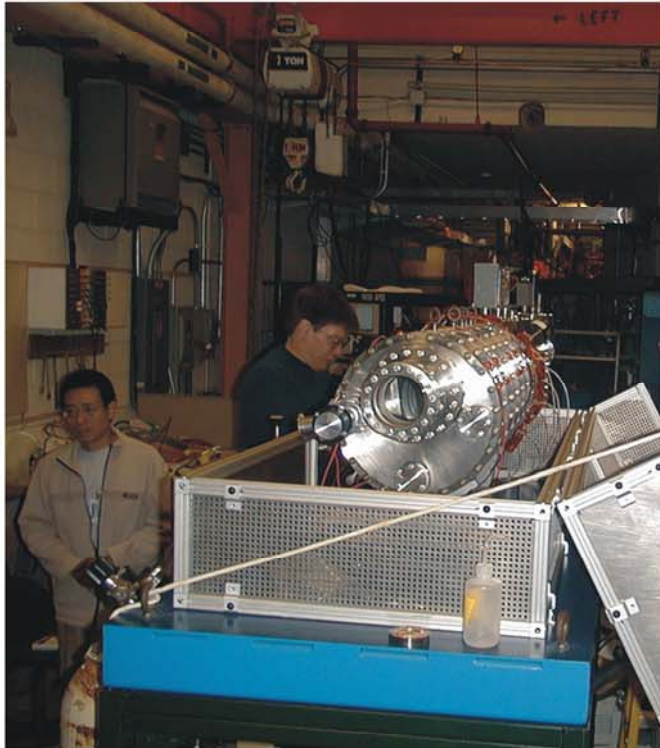
K - isomerism

$I_{\text{prod}} = 0.2 \text{ ion/s}$



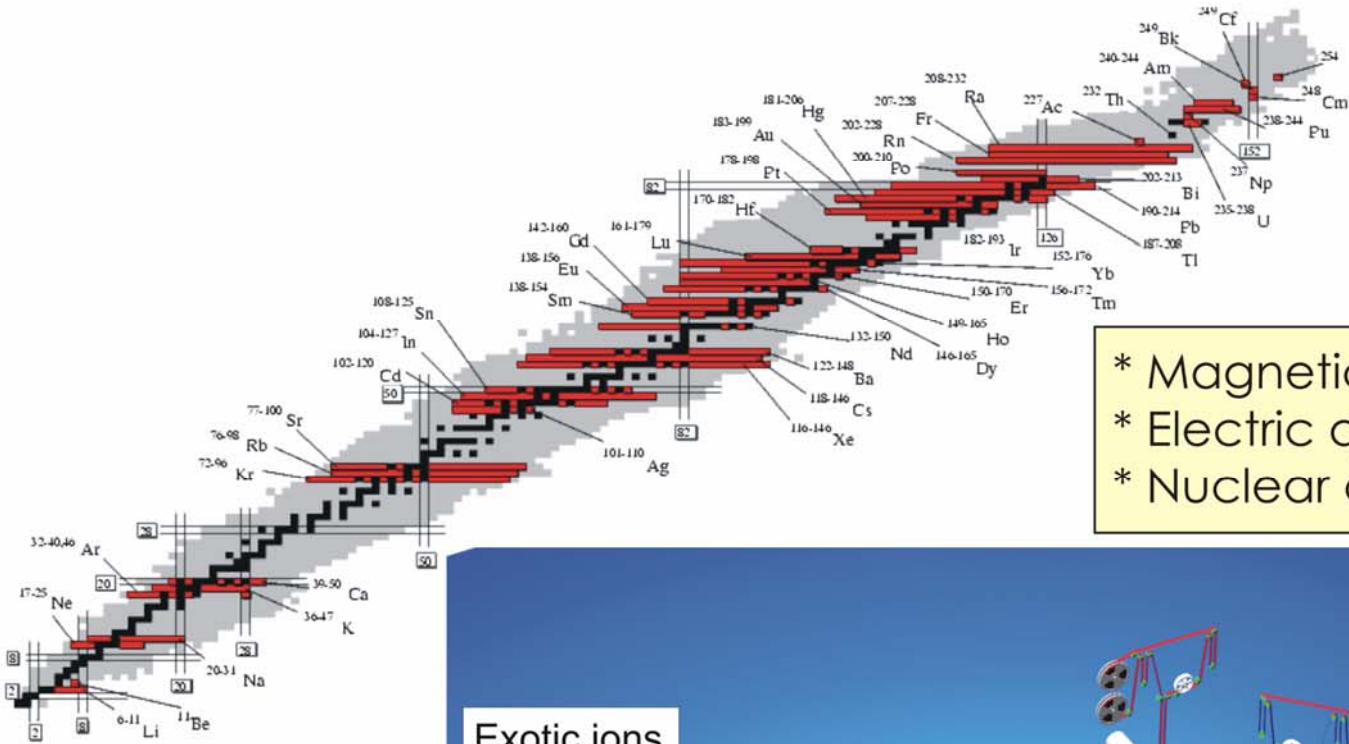
FRS: Zs. Podolyak et al.,
Phys. Lett. B491 (2000) 225
Warsaw Group

FRS Ion-Catcher Setup*: a study for the LEB of the Super-FRS

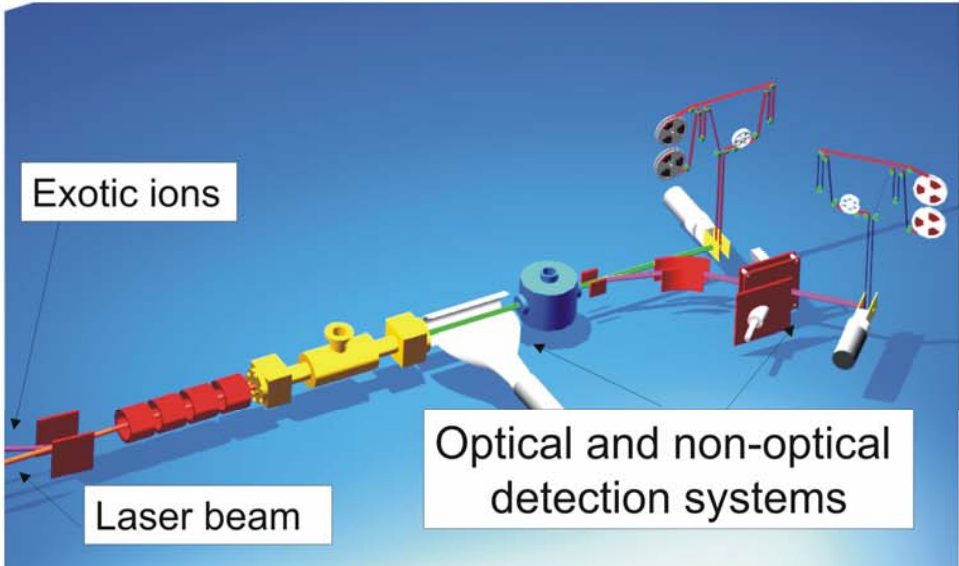


* Part of the European RTD Network "ION CATCHER"

Collinear LASER spectroscopy



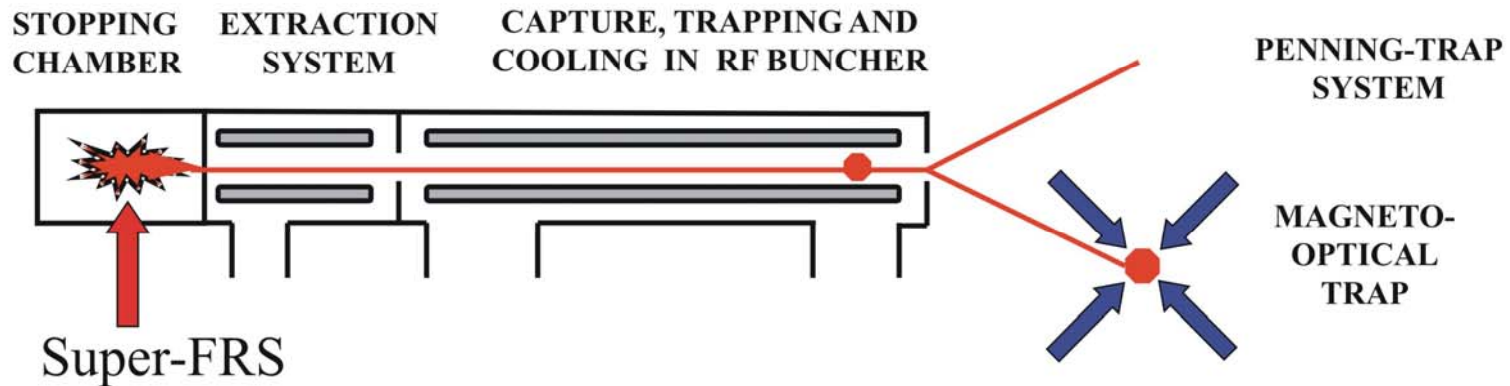
- * Magnetic dipole moments
- * Electric quadrupole moments
- * Nuclear charge radii



Experiments in ion and atom traps

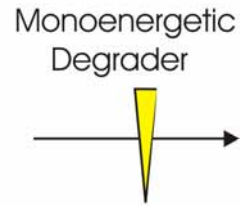
- * Nuclear structure studies
- * Tests of SM
- * Nuclear astrophysics

Nuclear binding energies, Q-values, superallowed β -decay, unitarity of CKM-Matrix β - ν -correlations (search for scalar weak interact.)

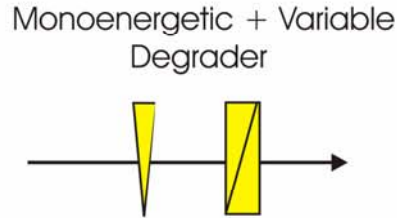


Opportunities at the LEB

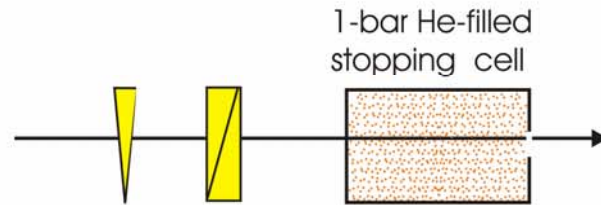
Slow beams
(~100...10 MeV/u)



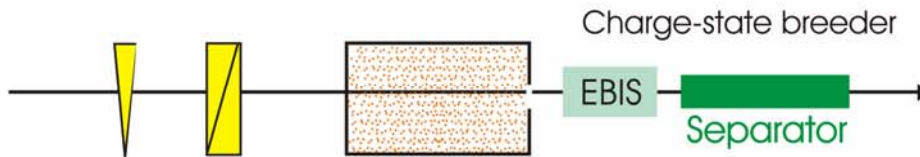
Stopped beams
(~25 meV)



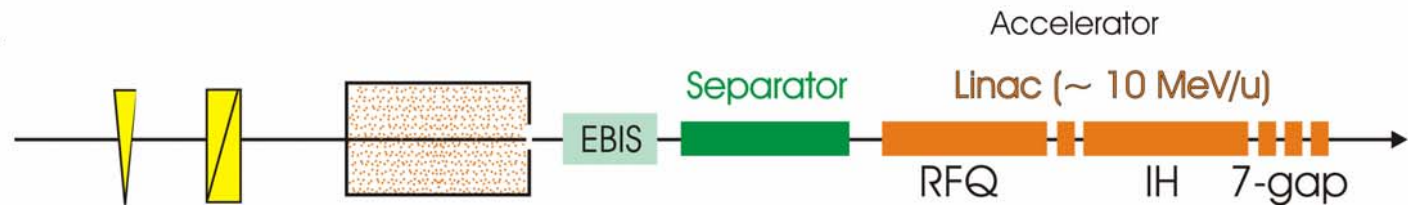
ISOL-type beams
(~10...100 keV)



Highly-charged ions



Re-accelerated beams
(~1...10 MeV/u)



Probing new fields at LEB with:

- swift monoenergetic exotic beams
(gamma-ray spectroscopy)
- ISOL type beams
(laser spectroscopy, precision experiments)
- beam stopped in thin absorbers
(α , β , γ spectroscopy) - see the next talk