ISOLDE Workshop 2007

CERN

„*g* - factor measurements

on Coulomb excited radioactive ^{138}Xe

beams of 2.78 MeV/A at REX-ISOLDE“

by

J. Leske
TU Darmstadt

K.-H. Speidel, S. Schielke
University of Bonn

A. Jungclaus, V. Modamio, J. Walker
Universidad Autonoma de Madrid, Spain

R. Krücken, R. Gernhäuser, T. Kröll, P. Maierbeck
TU München

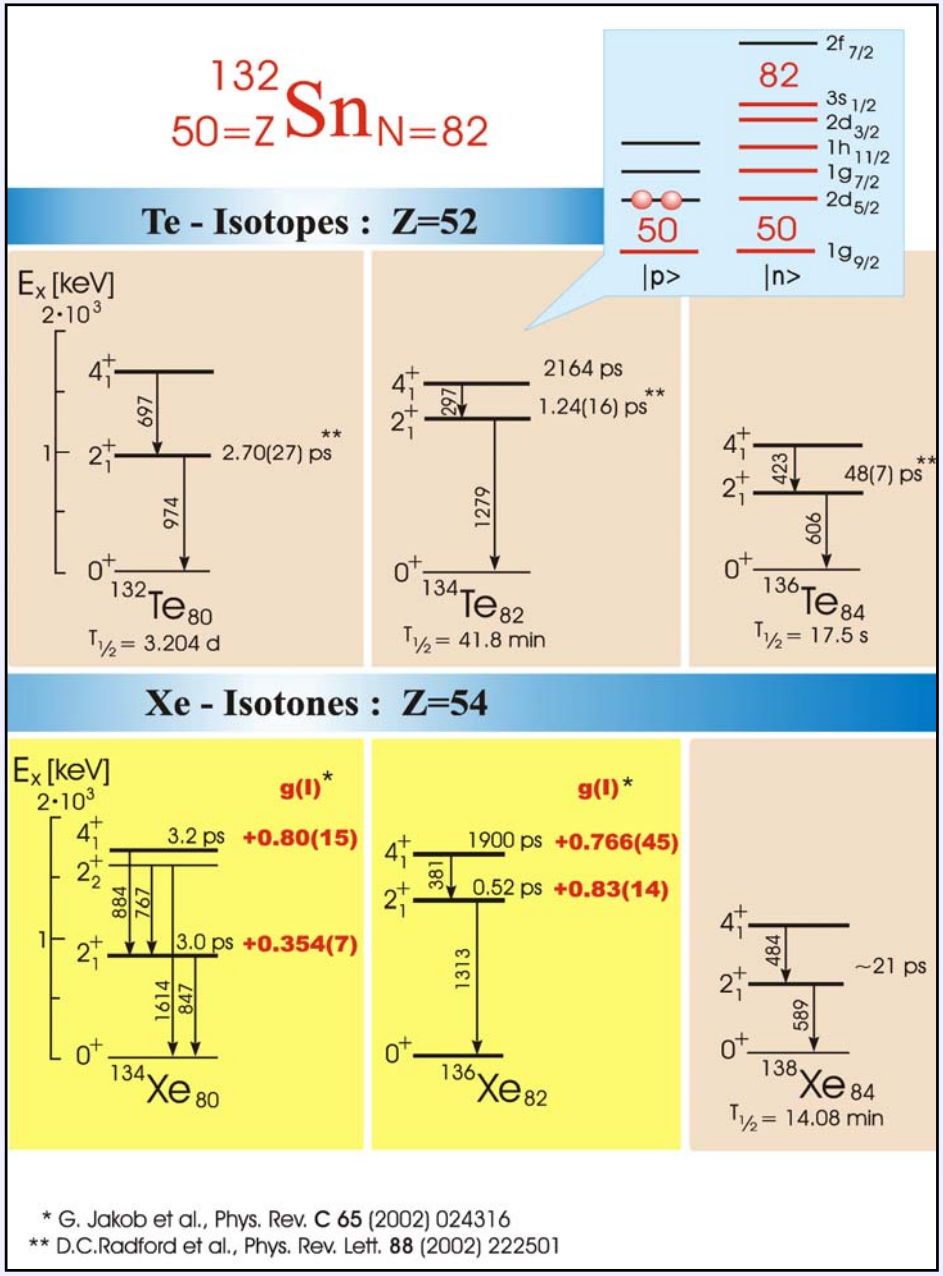
R. Lutter
LMU München

D. Balabanski
Sofia

G. Georgiev
Orsay

J. Gerber
IReS, Strasbourg, France

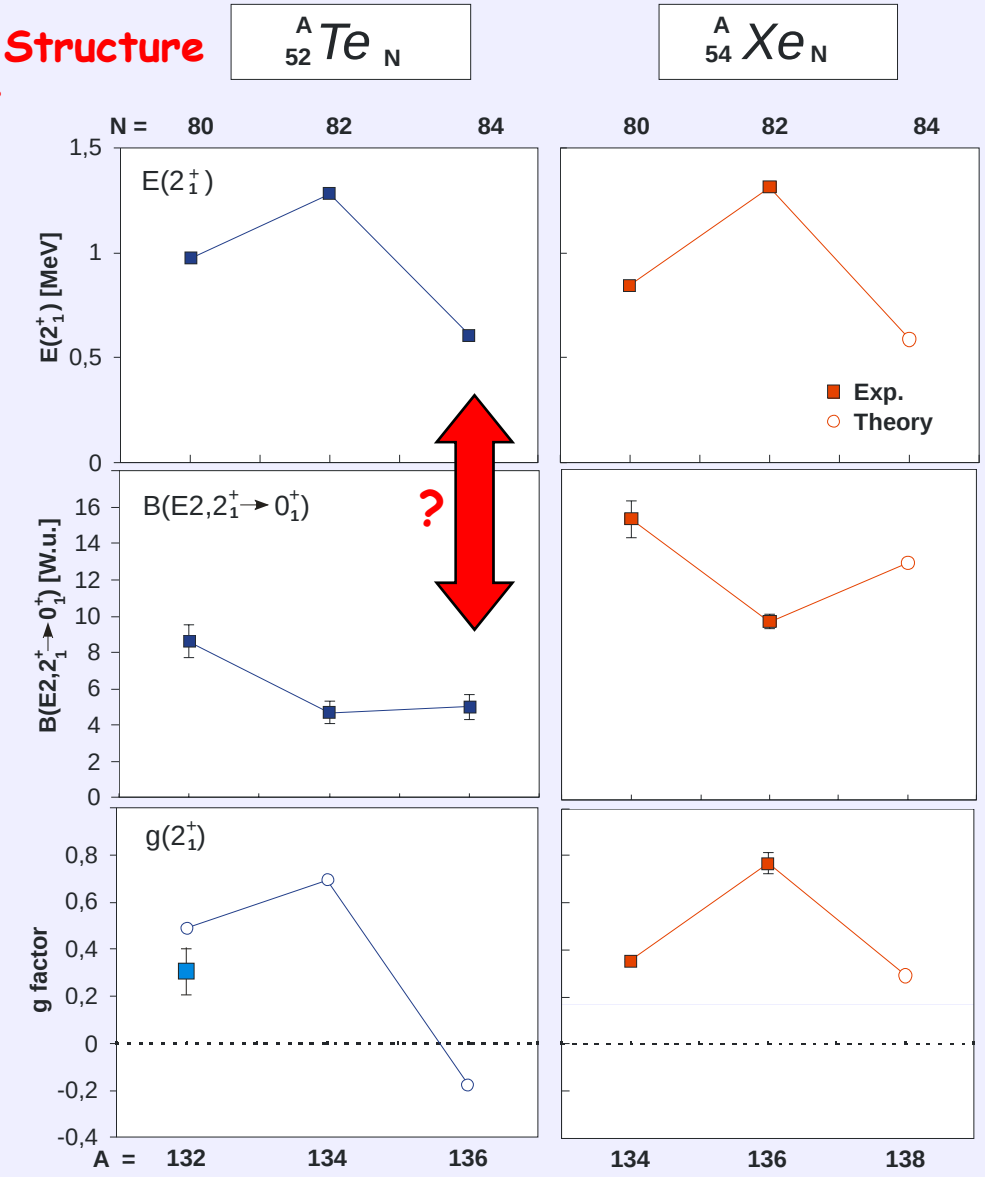
Introduction

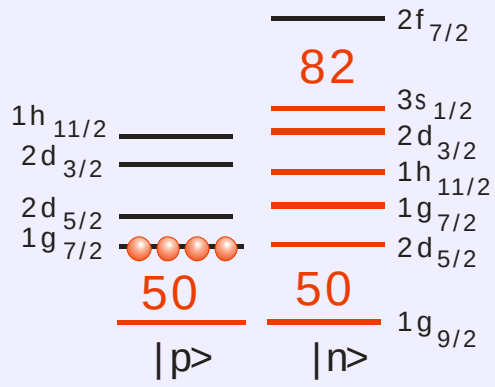


Goal : Measurement of $g(2_1^+)$ factors of radioactive Te- and Xe isotopes using TF-Technique

- 2 test experiments with stable ^{48,50}Ti beams and MINIBALL at the Cologne Tandem Accelerator
- 2 experiments at REX-ISOLDE with ^{138}Xe beams @ 2.78 MeV/u

Nuclear Structure Interest





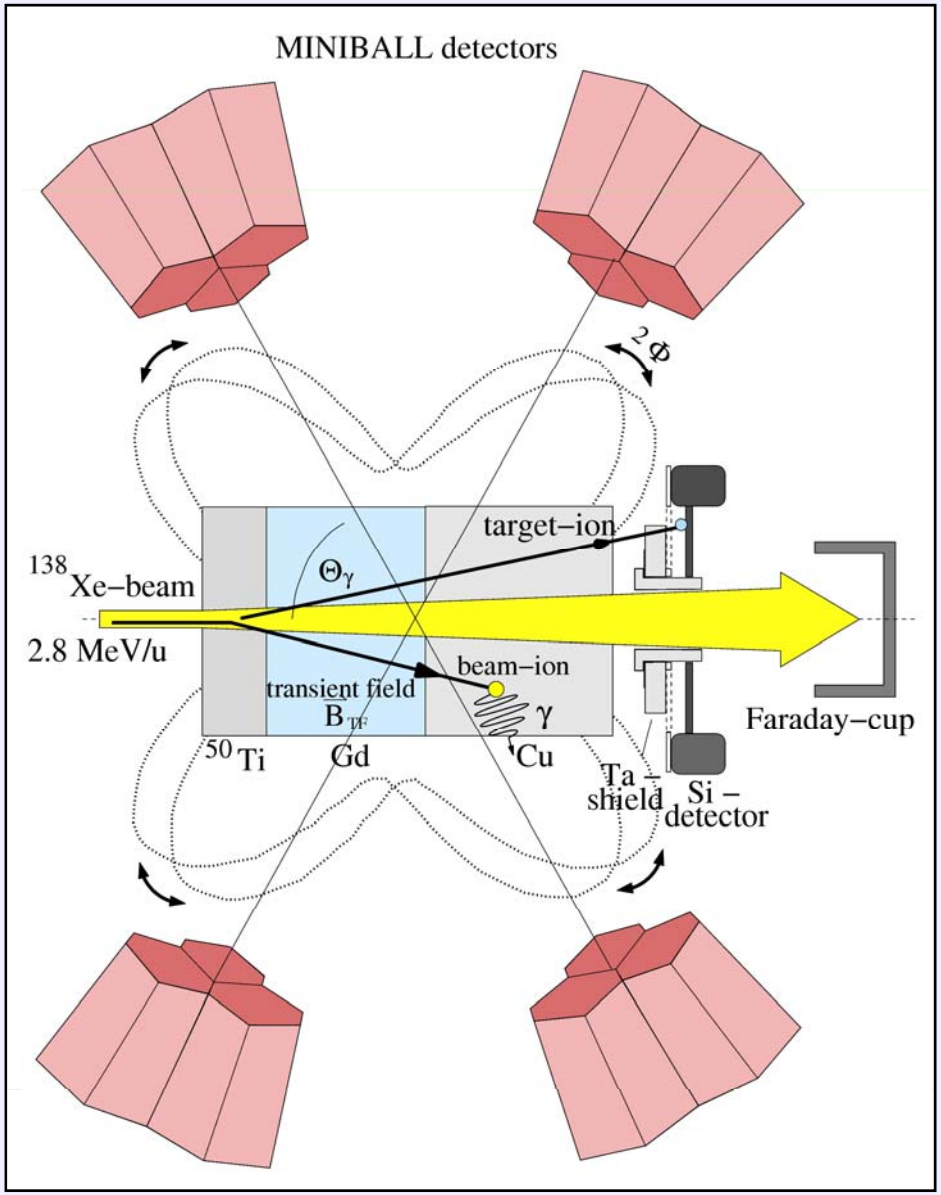
	$g_{schmidt}$		
$g_{7/2}$	+ 0.491	- 0.547	$f_{7/2}$
$d_{5/2}$	+ 1.917		
$d_{3/2}$	+ 0.083		
$h_{11/2}$	+ 1.417		

- $g(2^+_1)$ in ^{138}Xe with $\pi(1g_{7/2})^2 + \nu(2f_{7/2})^2$ configuration ?

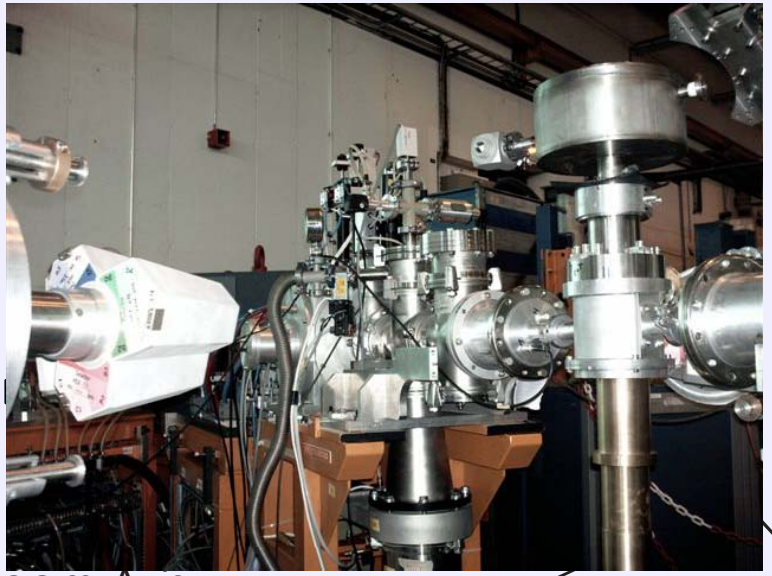
calc.: J.Terasaki et al., Phys.Rev. **C 66** (2002) 054313

exp.: G.Jakob et al., Phys.Rev. **C 65** (2002) 024316
D.C. Radford et al., Phys.Rev.Lett. **88**(2002) 222501
N. Stone et al., Phys.Rev.Lett. **94**(2005) 192501

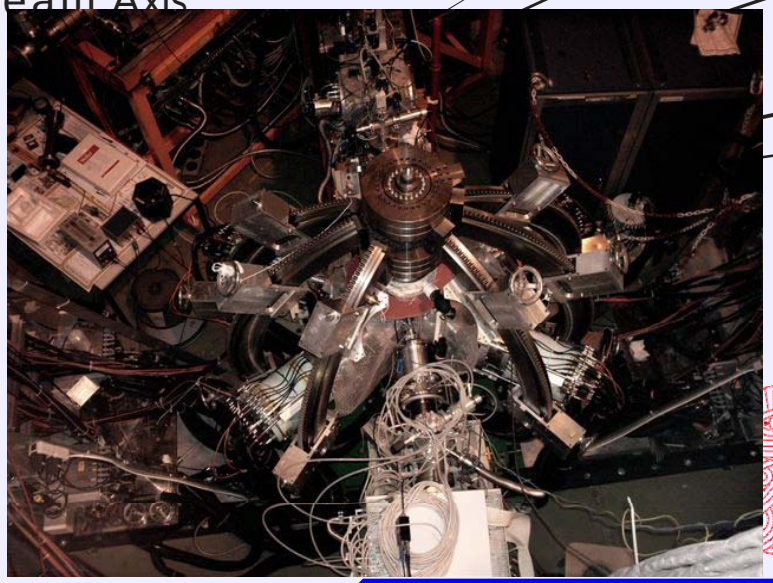
Setup and Method



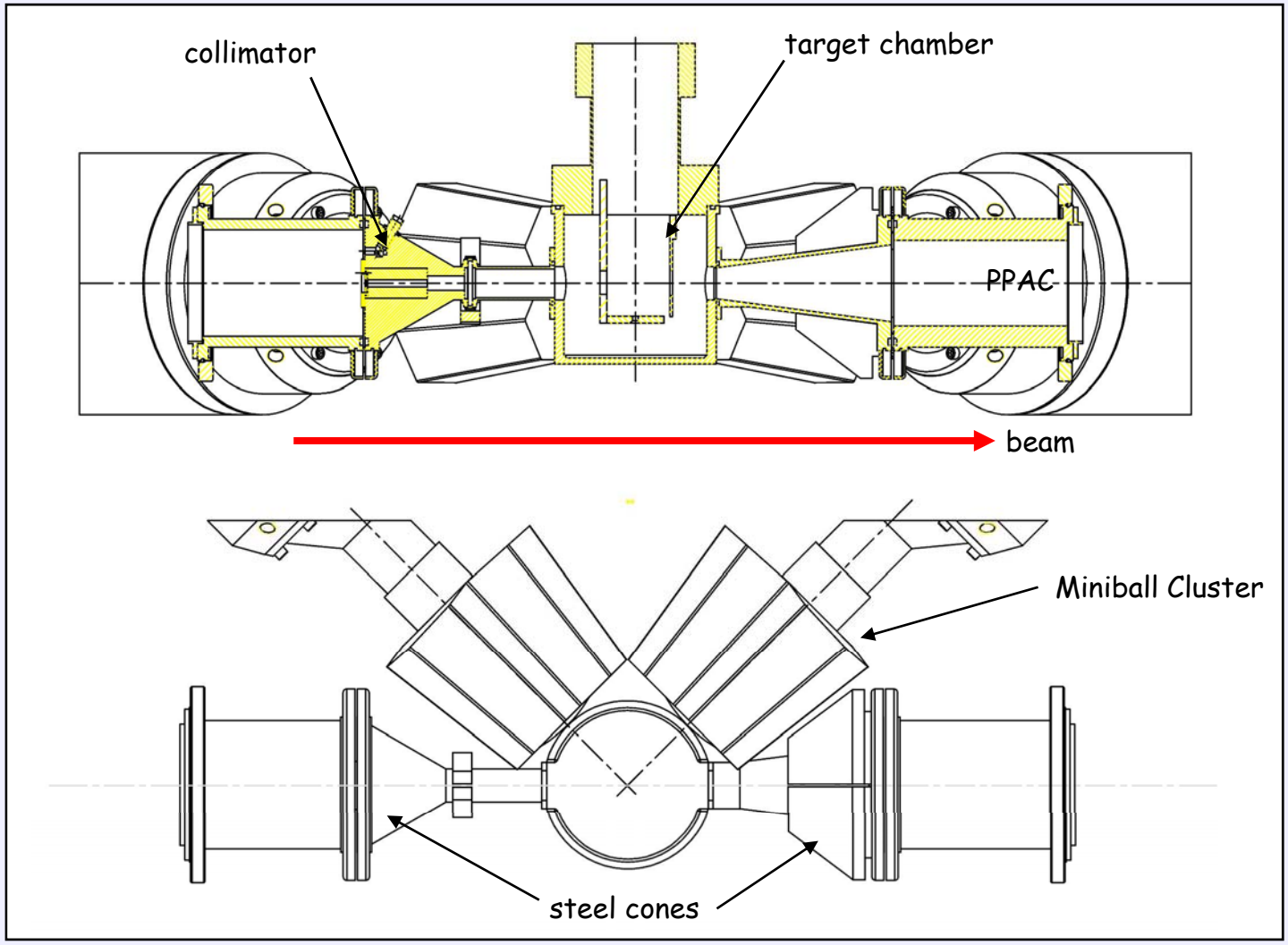
Angular Correlation



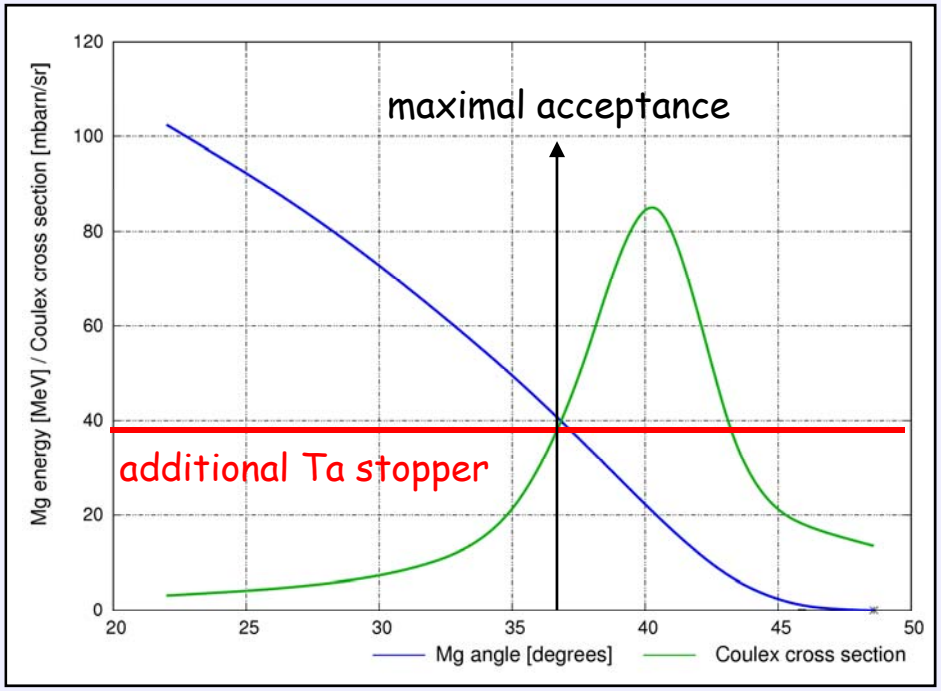
Beam Axis

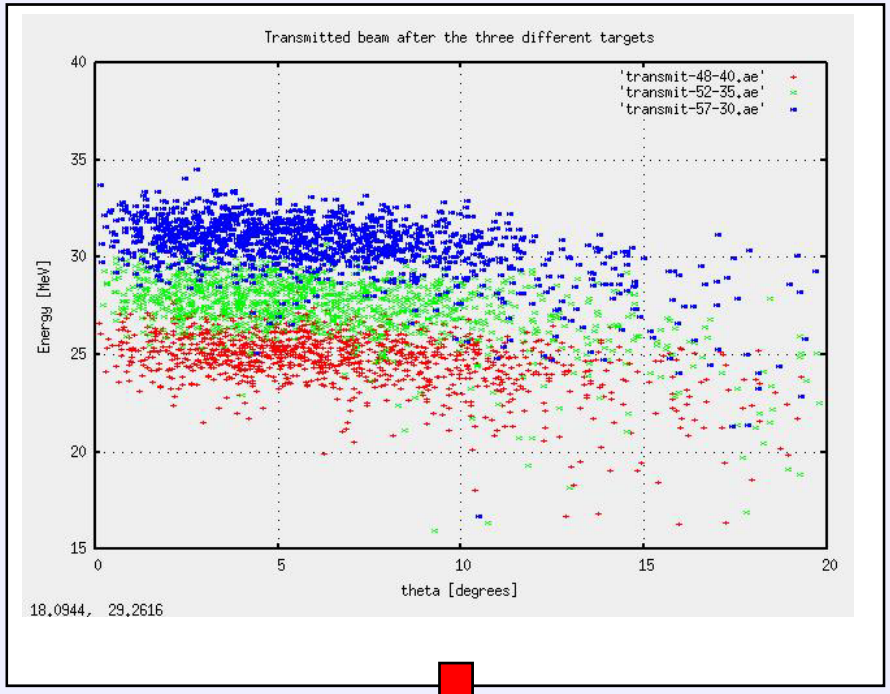


Chamber & Shielding



Problem: Separation of elastic an Coulex events



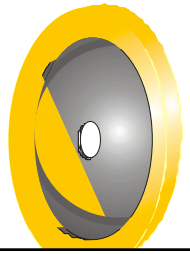


- steering beam trough center hole of the Si detector not sufficient
- additional stopper required
- Result : unwanted radioactivity and small acceptance

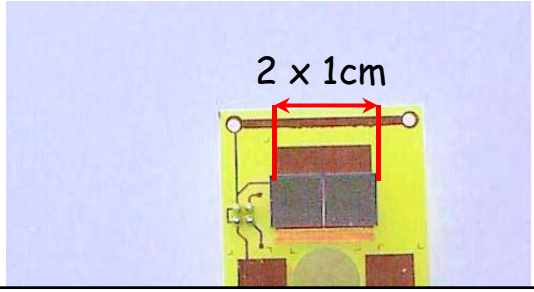
0.17% of the total beam intensity between 37° and 45°...too much

Particle Detectors

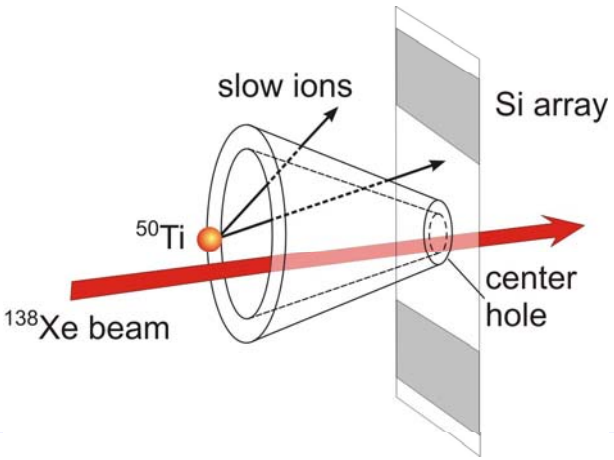
1st experiment

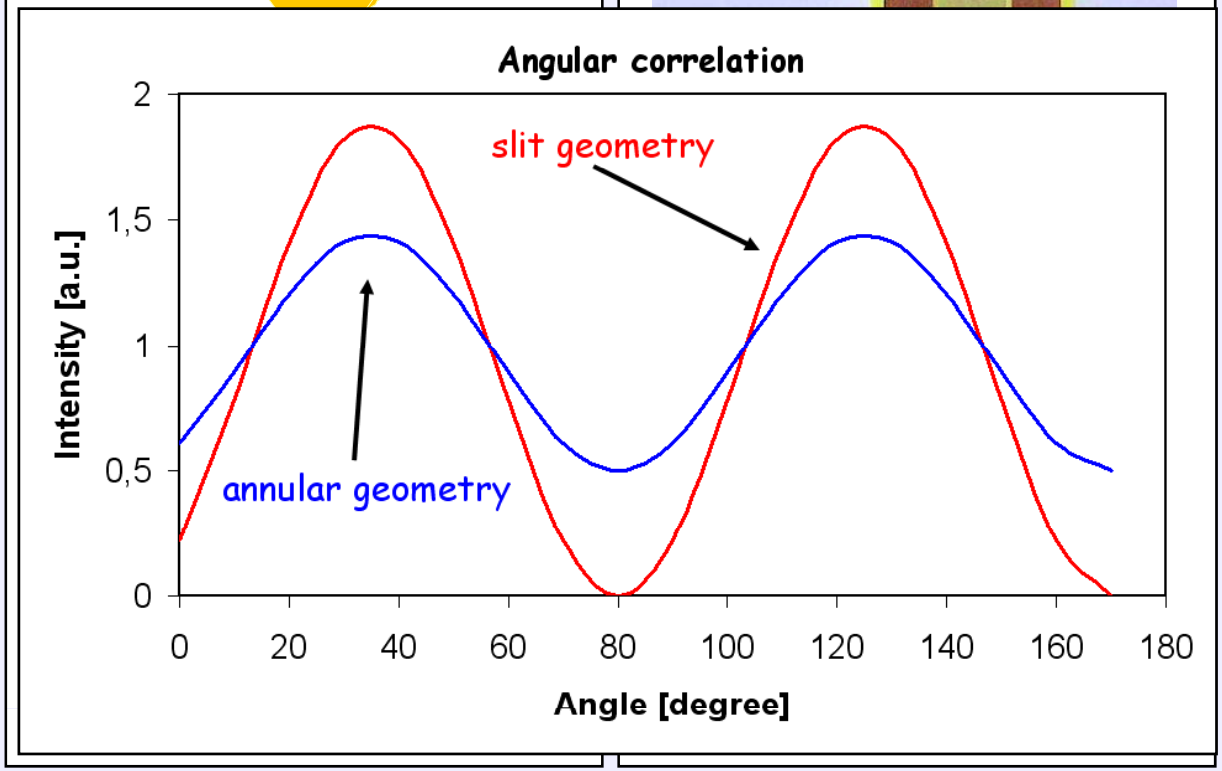


2nd experiment

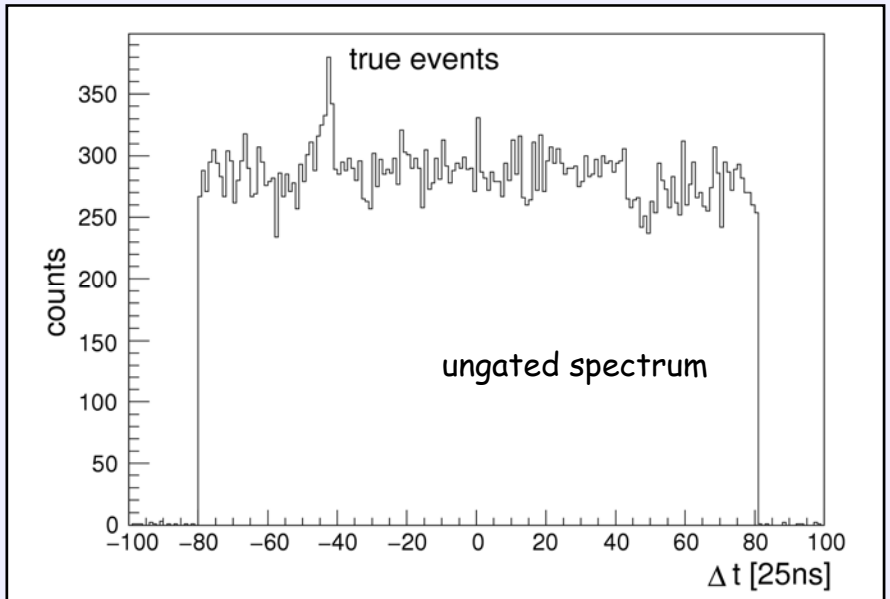


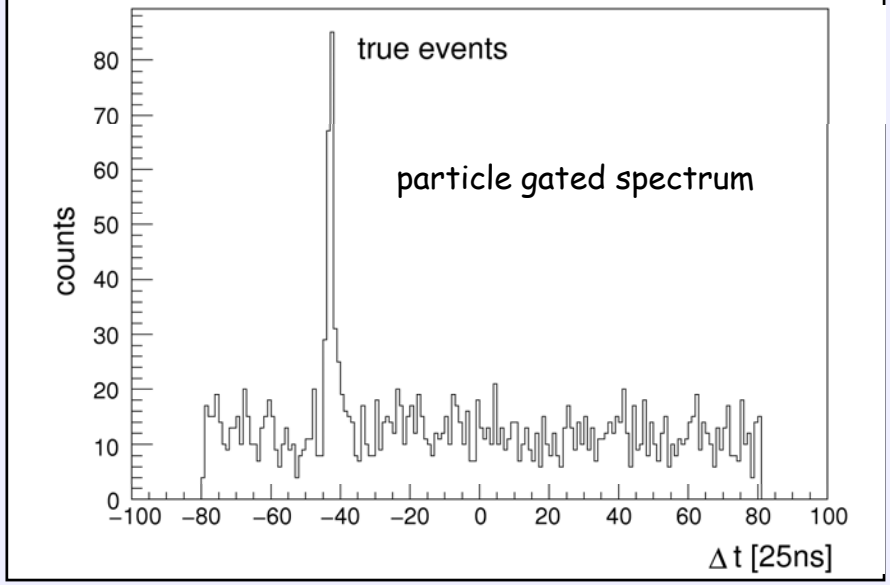
differential stopping



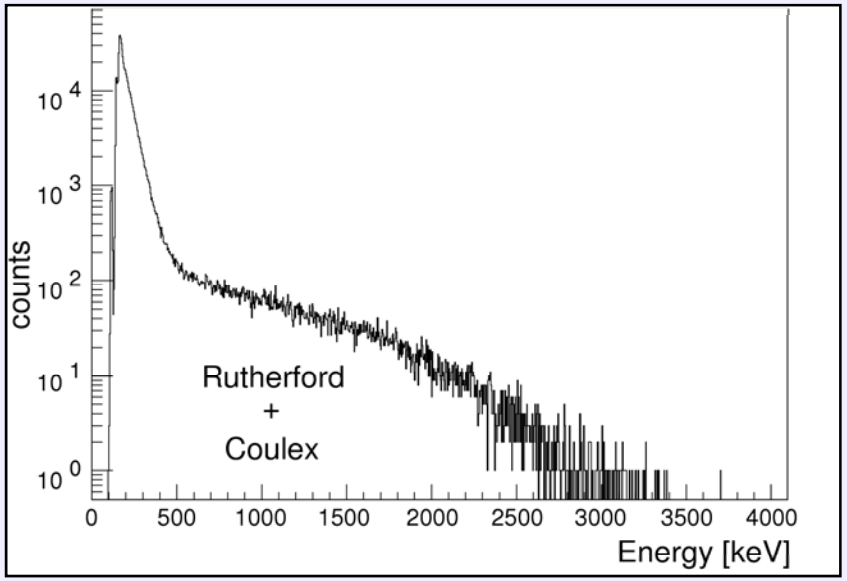


Time spectra



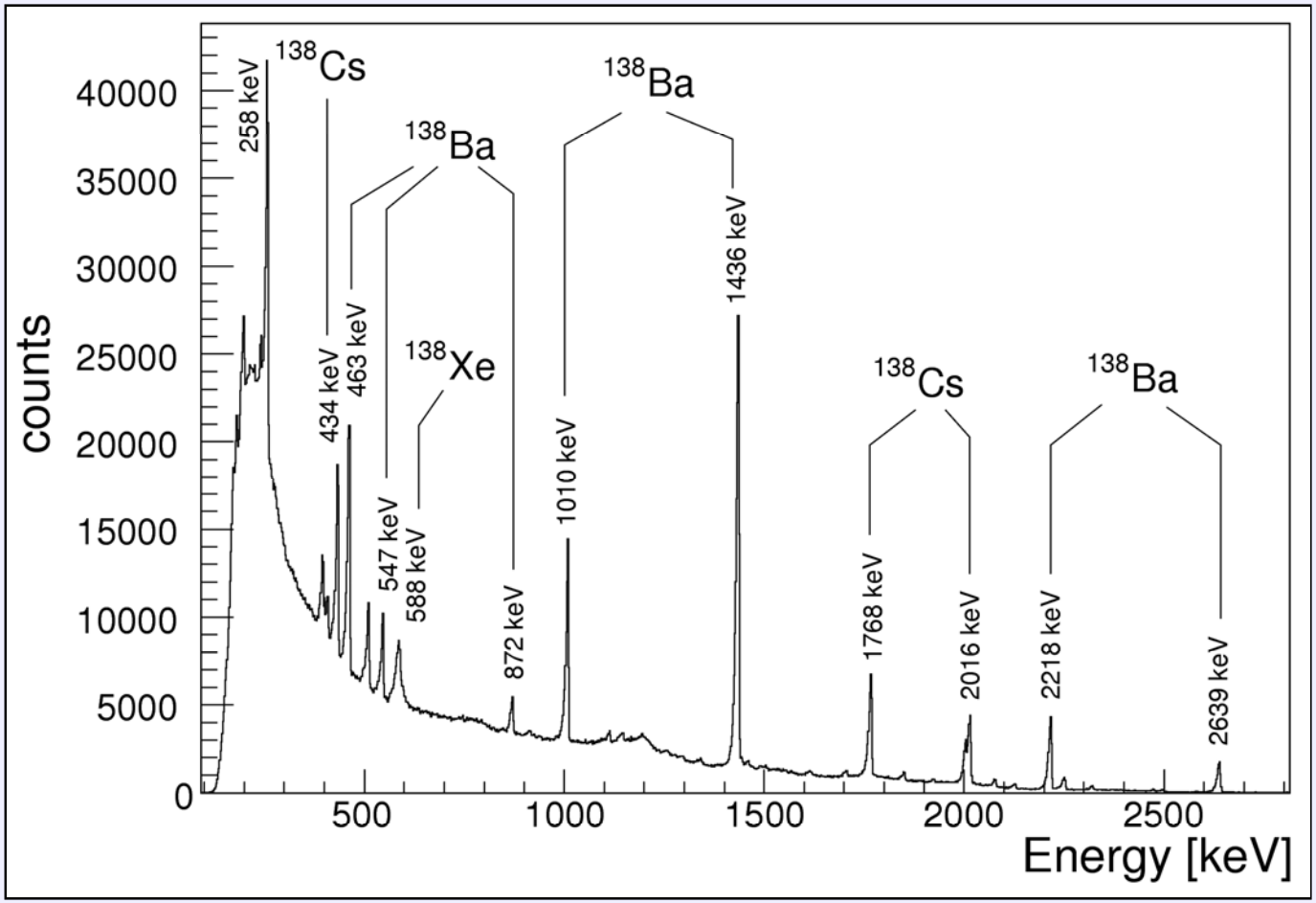


Particle Spectrum



- Time spectra with DGF and ADC timestamps or TDC

Sum spectra of Miniball cluster detectors



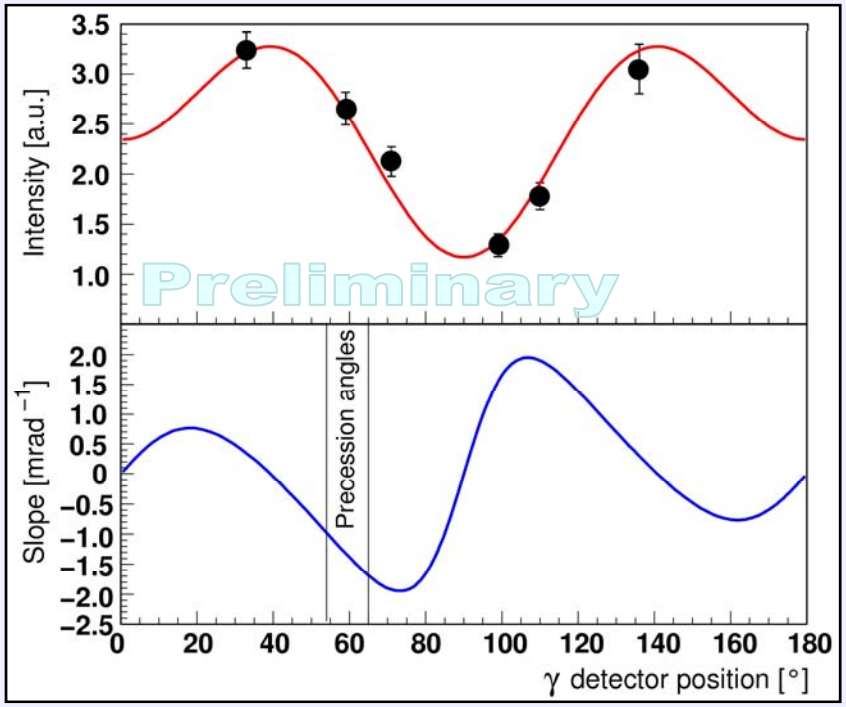
„Cleaning up" the γ spectra

- find physical events
- search or particle-γ concidence
- gate on particles
- time gate on true events
- random substraction

Gated Spectra are background free !

First results

Angular Correlation



$|S|_{exp}$ = 1.7(2) mrad^{-1}

$|S|_{calc}$ ≈ 2.0 mrad^{-1}

- Feasability proofed with stable and radioactive beams
- Handling of radioactivity
- Measured angular correlation
- Precession analysis on the way

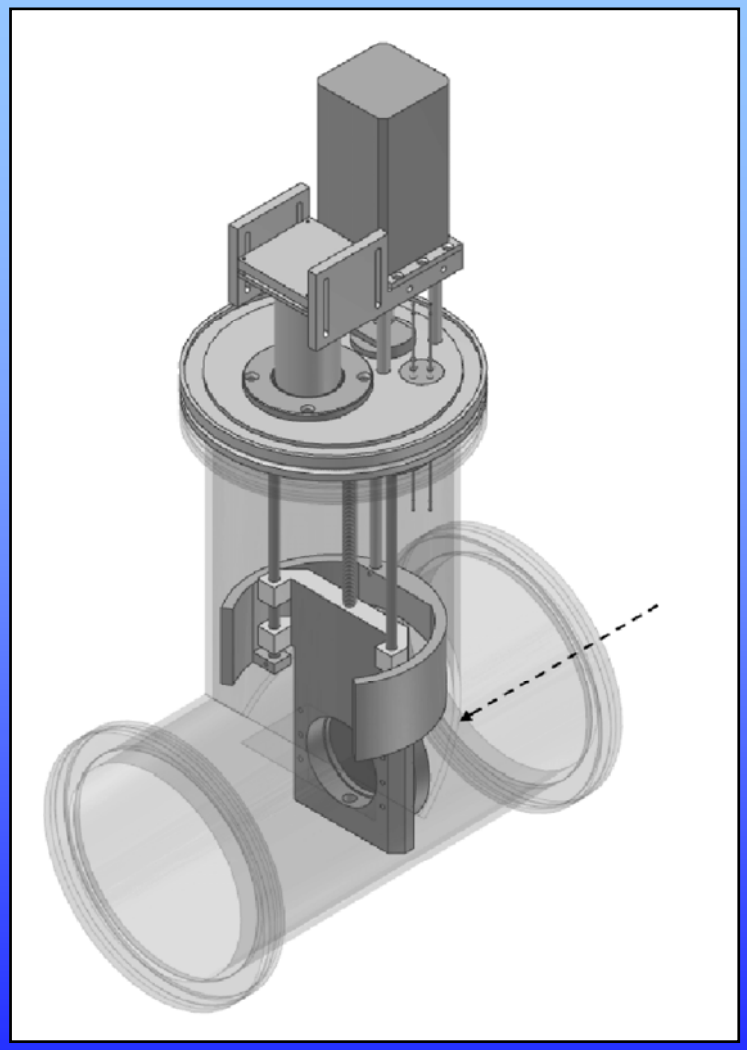
To do:

- Increase particle detection efficiency

  (improve mass ratio and/or beam energy, use segmented Particle detector)
- improve beam quality

Outlook

beam diagnostics close to the target area



New proposals

- Increase particle detection efficiency

Go to lighter isotopes:

Cr, Ni and Zn

Thank's for your attention !