

^{1,2} T. ARICI

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Introduction

Nuclei in the vicinity of the N=Z line around A=70 exhibit very rapid shape changes due to the isospin symmetry breaking related to charge effects. This leads to differences in excitation energy between analogue states in isobaric multiplets. In this study we probed Coulomb energy differences in the $T_z = -1$ nucleus ^{70}Kr with respect to its mirror ^{70}Se . Coulomb excitation and knock-out reactions have been used to deliver the $^{70-72}\text{Kr}$ isotopes in their excited states using the BigRIPS fragment separator. The experiment was performed at the Radioactive Isotope Beam Factory (RIBF), RIKEN.

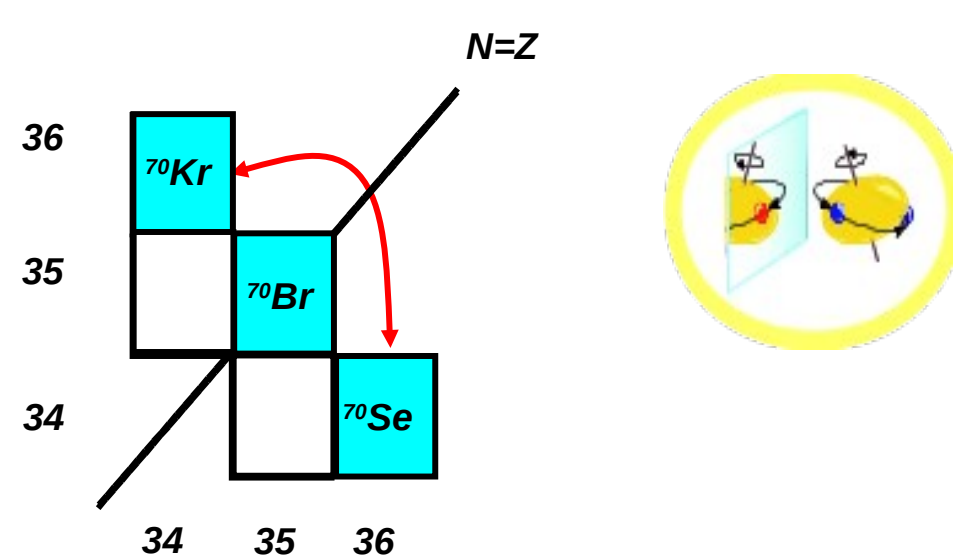
$$\text{MED}_J = E_{X_{J,T_z=-T}} - E_{X_{J,T_z=+T}}$$

Test the charge symmetry of the nuclear interaction



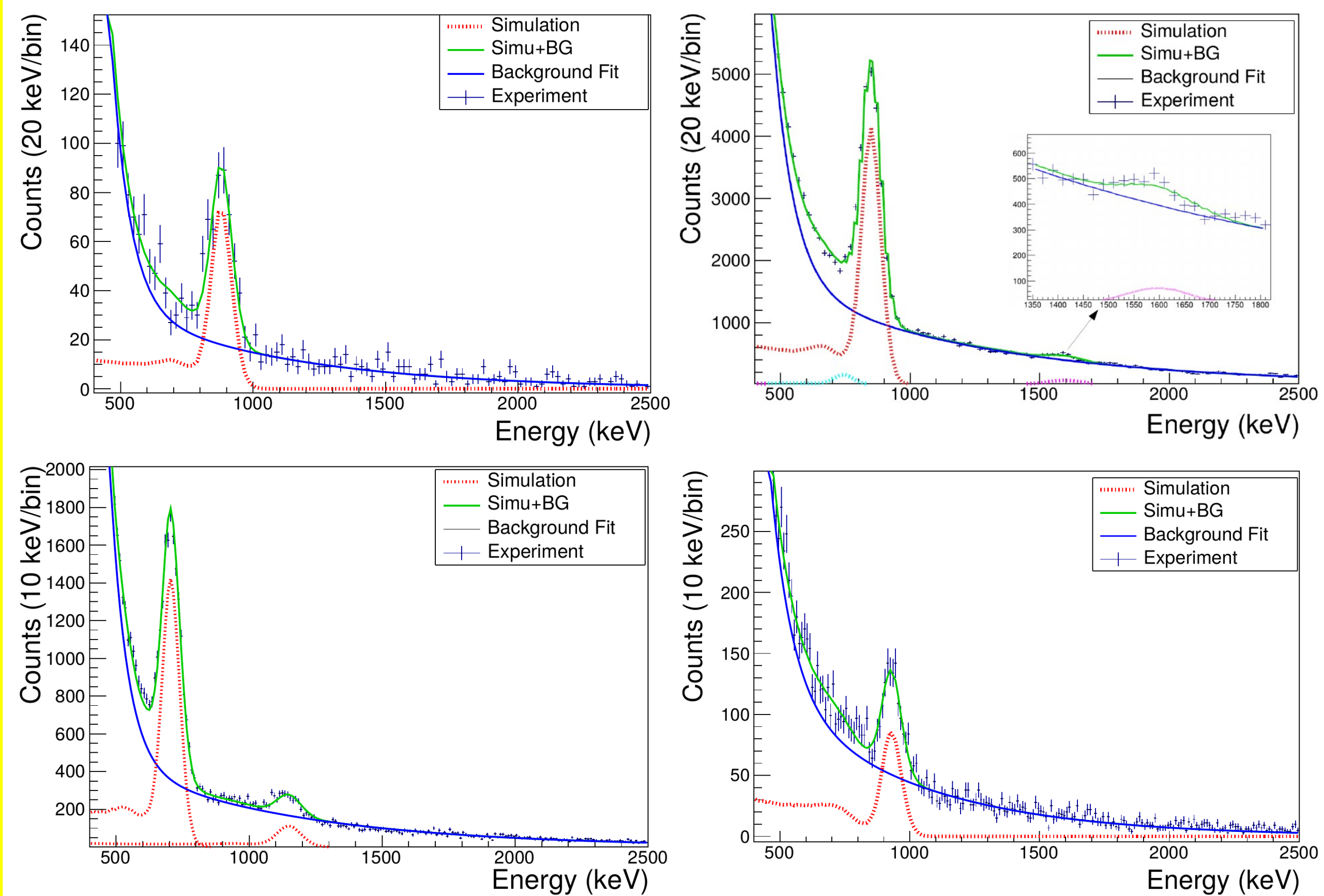
$$\text{TED}_J = E_{X_{J,T_z=-T}} - E_{X_{J,T_z=+T}} - 2E_{X_{J,T_z=0}}$$

Test the charge independency of the nuclear interaction



Results

The Doppler corrected gamma ray spectra are extracted from fully stripped ejectiles detected in coincidence with the BigRIPS and ZeroDegree spectrometers. The number of the gamma rays emitted as a result of Coulomb excitation are extracted by fitting the line shapes with simulated response functions.



The excitation cross-sections for $2^+ \rightarrow 0^+$ are used to extract the Coulomb and nuclear deformation lengths δ_c and δ_n using ECIS-97 code.

$$\beta_c = \frac{\delta_c}{R_c}$$

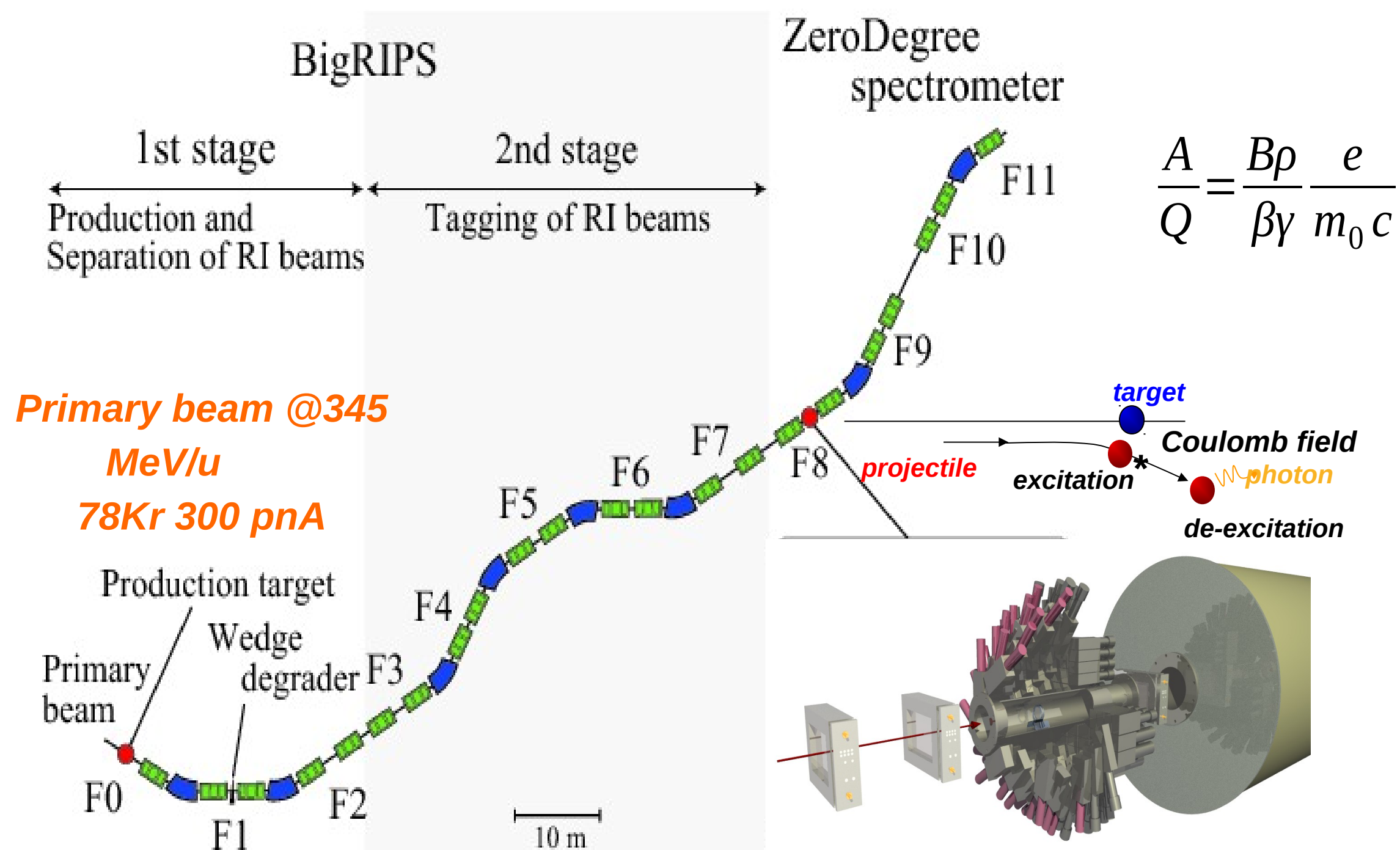
$$B(E2) \uparrow = \left(\frac{3zeR_c^2}{4\pi} \right) \beta_c^2$$

Extracted $B(E2) \uparrow$ values for ^{70}Kr , ^{68}Se , ^{70}Br and ^{72}Kr isotopes.

	^{70}Kr	^{68}Se	^{70}Br	^{72}Kr
	(2_1^+)	$(2_1^+), (2_2^+)$	(2_1^+)	$(2_1^+), (2_2^+)$
$B(E2) \uparrow [e^2 b^2]$	0.34(5)	0.255(4)	0.14(2)	0.491(7)
		<0.02		0.06(1)

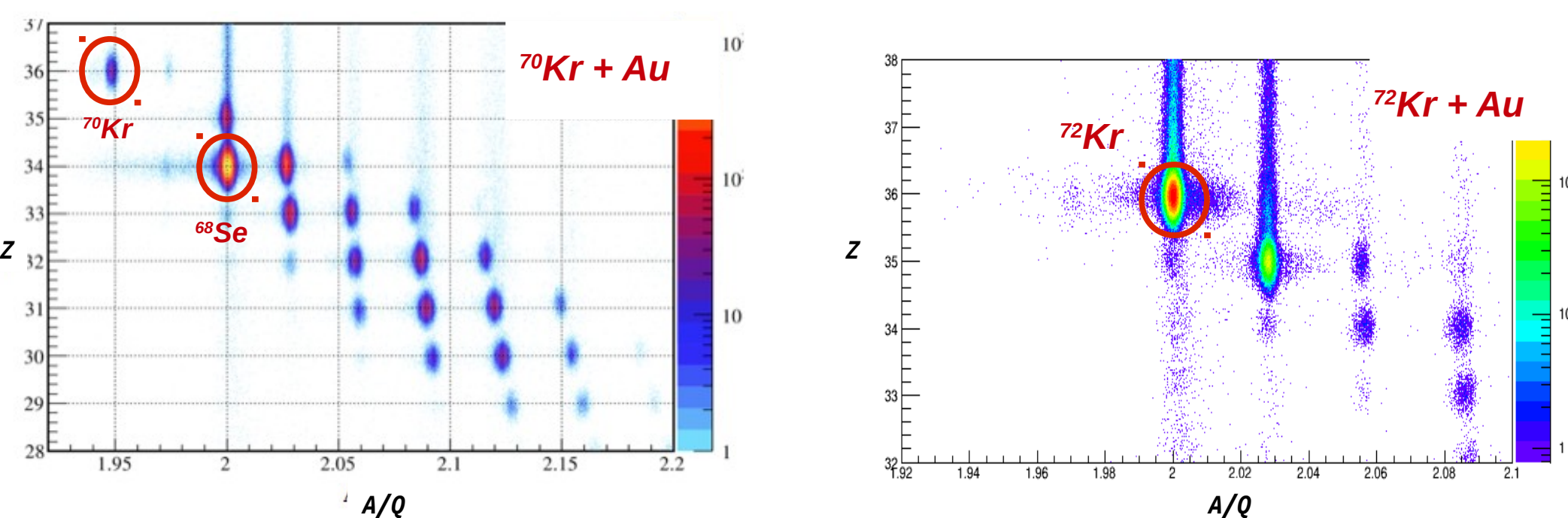
The observation of a rapid variation in the $B(E2; 0^+ \rightarrow 2^+)$ values indicates an increasing deformation and shape change within the IAS.

Method

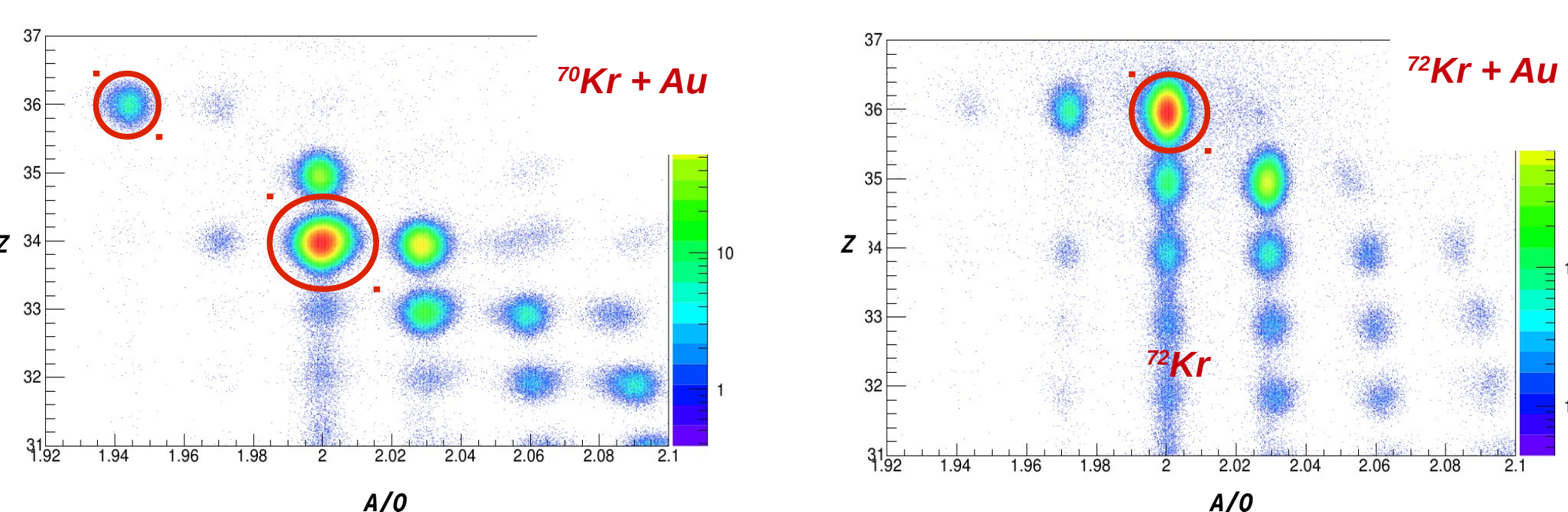


The gamma-rays from the reaction was detected in DALI2 array and the reaction products were identified in ZDS.

BigRIPS



ZeroDegree



The ΔE -TOF-Bp method was employed in order to identify isotope of interest from the other accepted reaction products.

Conclusions

No spectroscopic information was available so far for ^{70}Kr isotope. These results will allow to make a direct comparison with the mirror nucleus ^{70}Se and will give an important new information about shape-coexistence across the N=Z line.

Acknowledgment

This study was supported financially by "HGS-HIRe for FAIR".