Absolute E3 and M2 transition probabilities for electromagnetic decay $K^{\pi}=8^{-}$ isomeric state in ^{132}Ce

Research group:

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Motivation

The problem of the K selection rule violation for electromagnetic transitions in nuclei is not yet well understood.

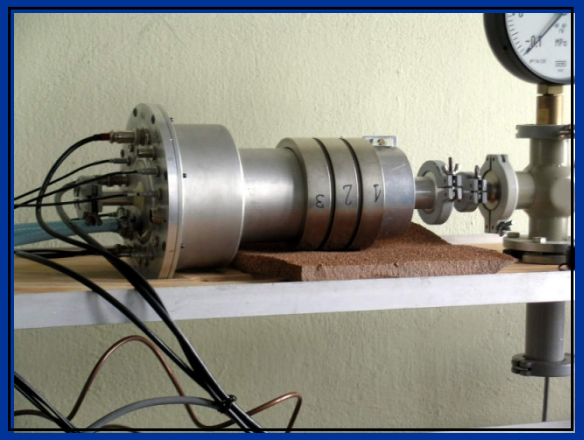
Measurement of absolute values of the transition probability which de-excite an isomeric state can help to clarify the underlying mechanism.

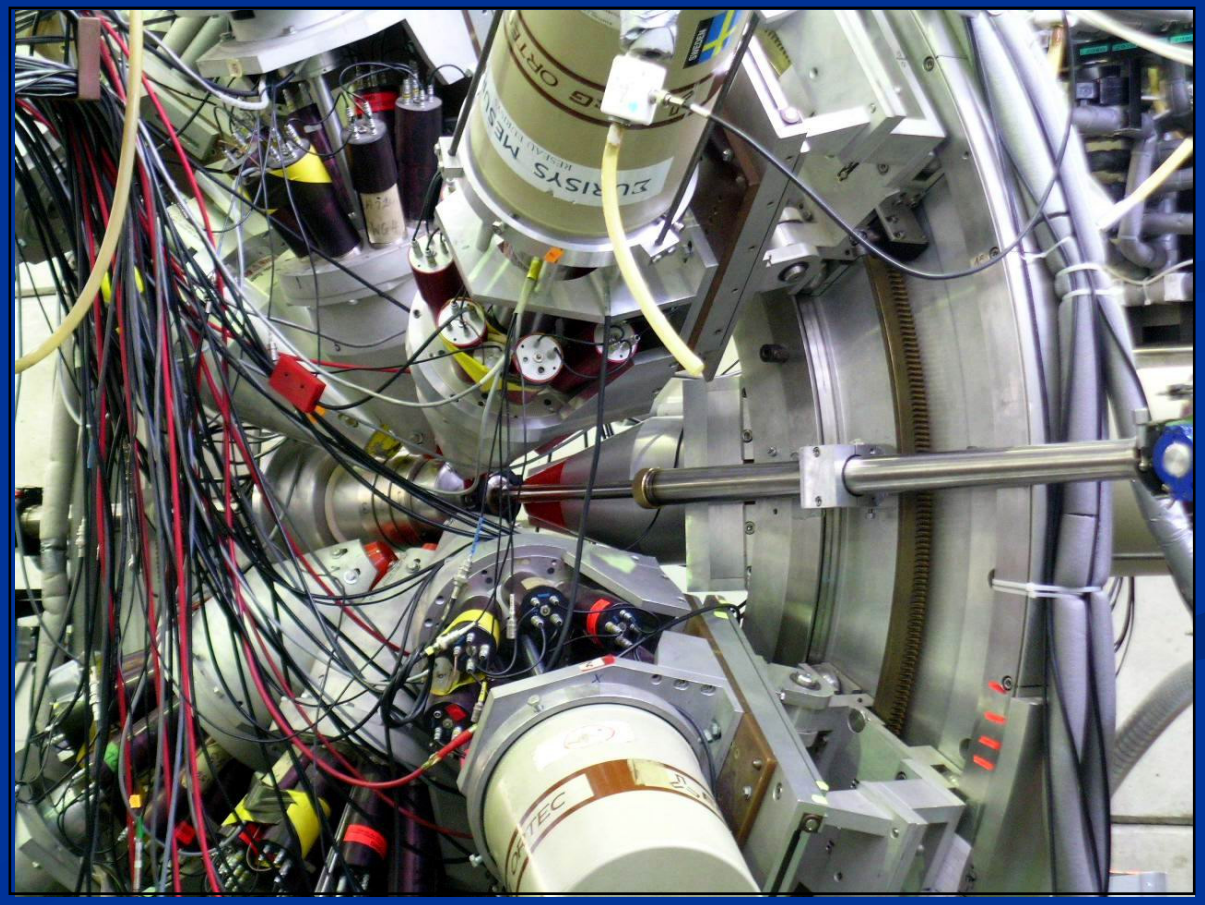
The nuclei from the mass area around A=130, exhibiting large triaxiality (γ around 20° ÷ 30°), constitute an excellent testing ground to study this phenomenon.

The $I^{\pi} = K^{\pi} = 8^{-}$ isomeric state in the even-even ^{132}**Ce** nucleus (N=74) has be studied.

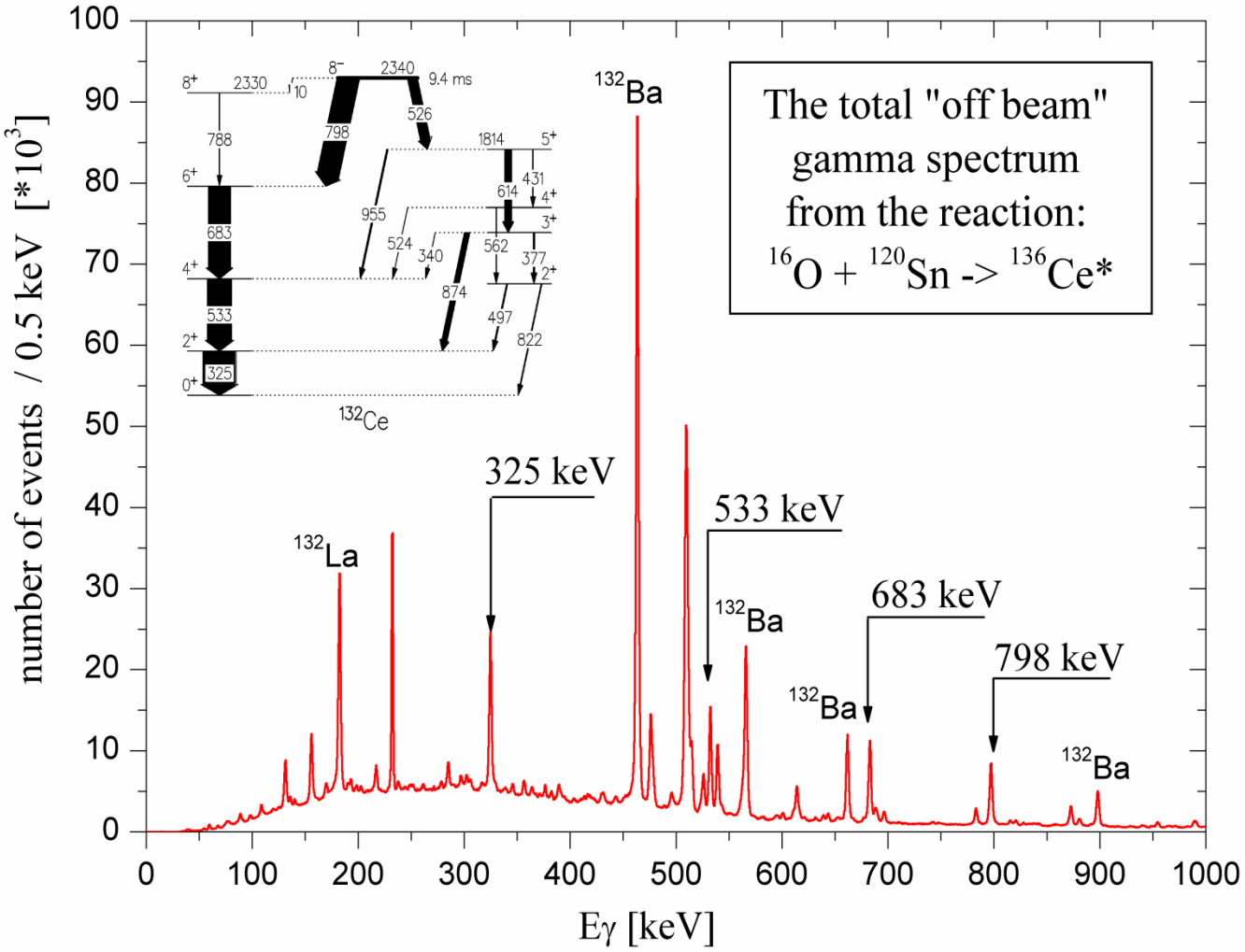
The experimental set-up

Simultaneous coincidence measurement of γ–γ and γ–e allow determining internal conversion coefficients and, in consequence, transition multipolarities.





Observed spectra



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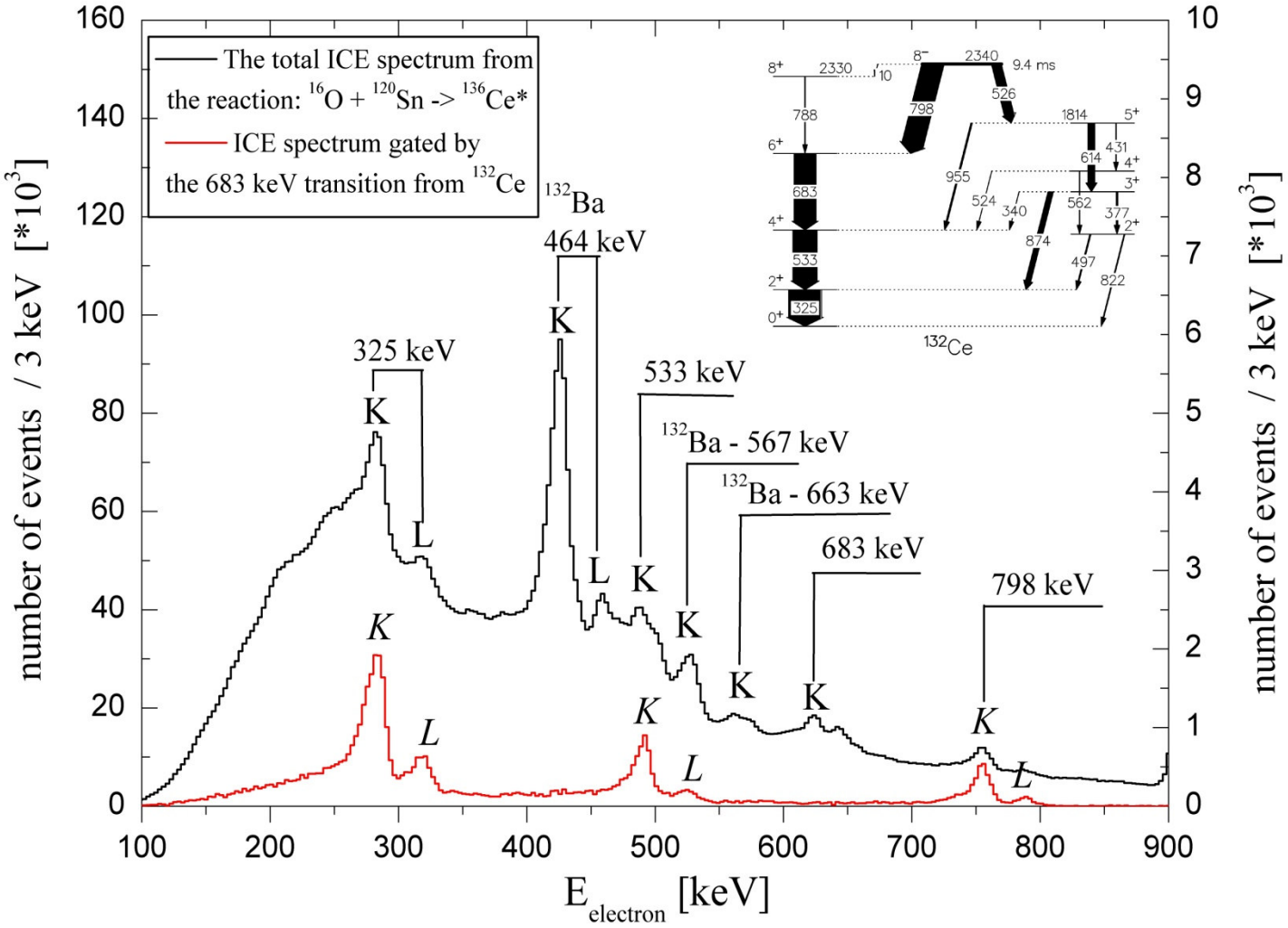
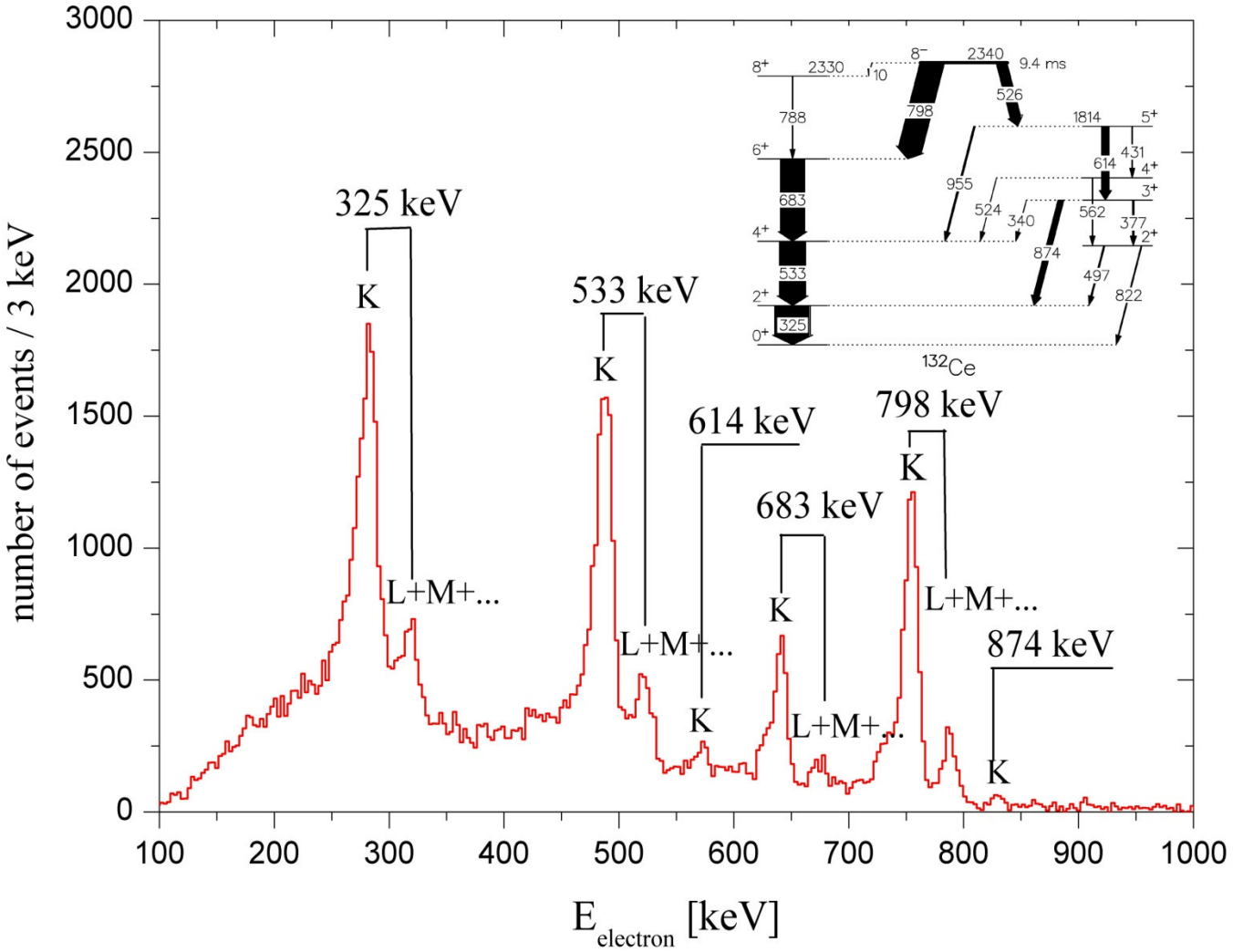
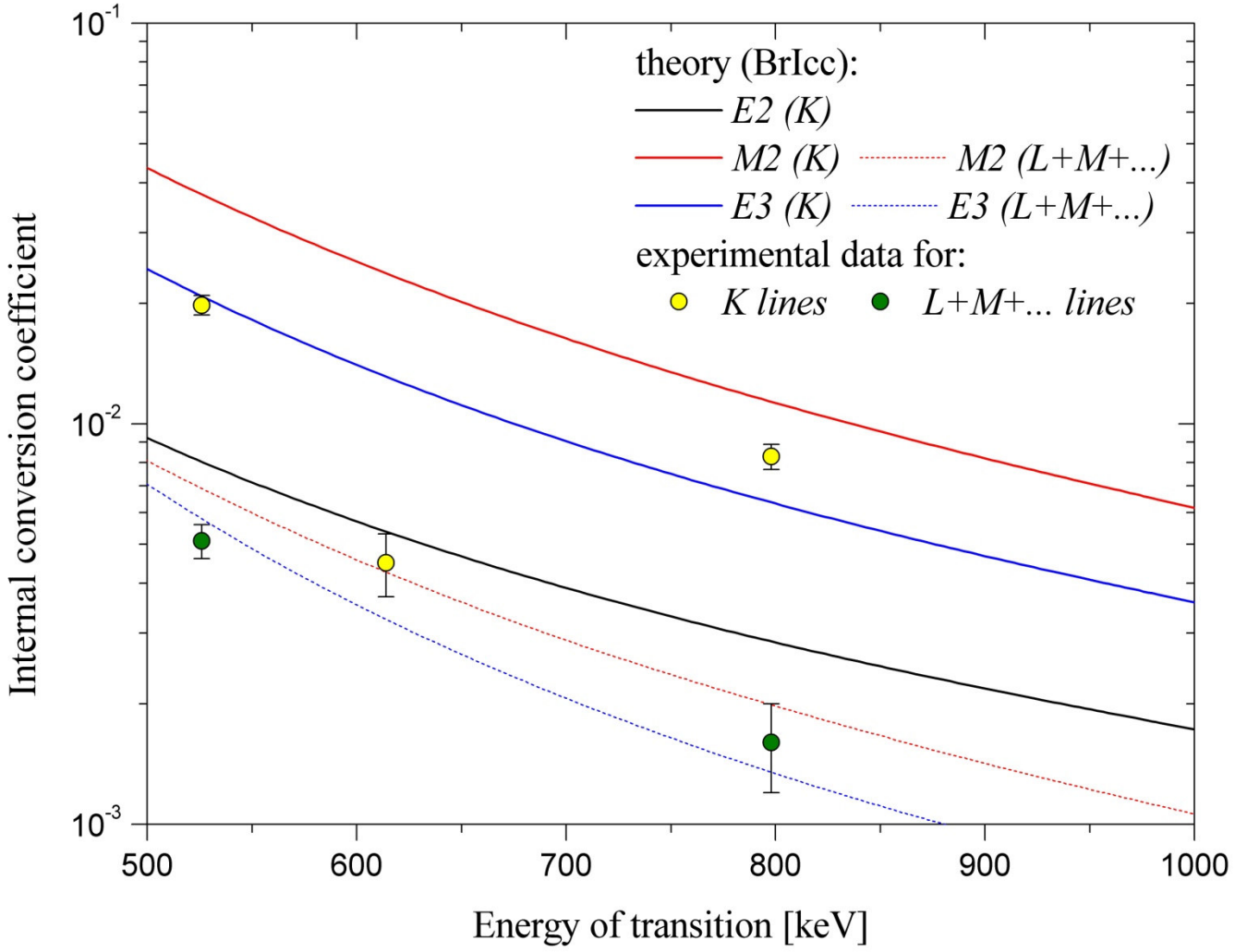


Observed spectra

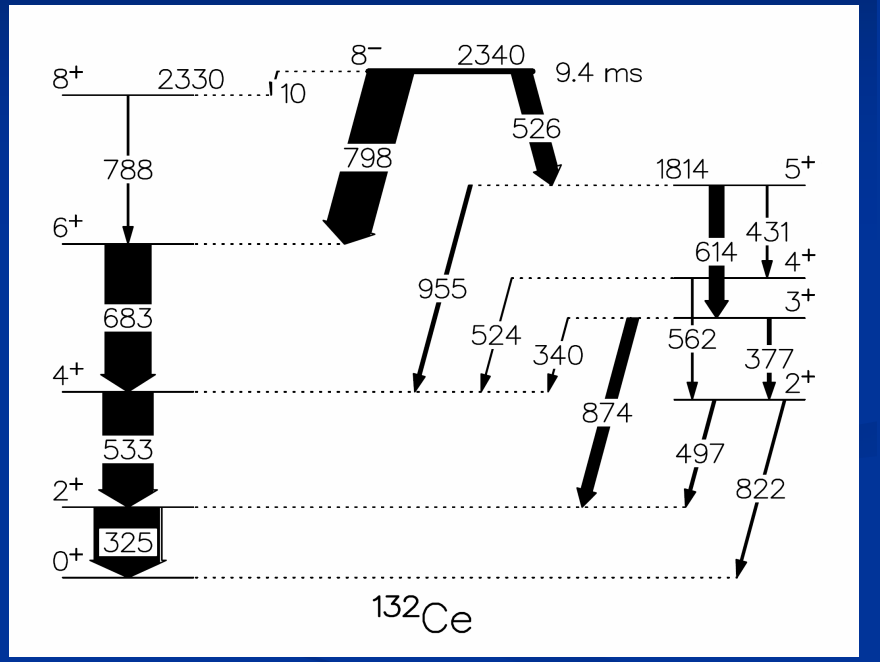


Results of the measurement for ^{132}Ce



Results of the measurement for ^{132}Ce

transition energy [keV]	526	798
intensity I_γ	30	68
multipolarity - λ	E3	65(9) % E3 35(9) % M2
reduced hindrance factor f_ν	6.7(3)	5.2(2) – E3 14.9(7) – M2



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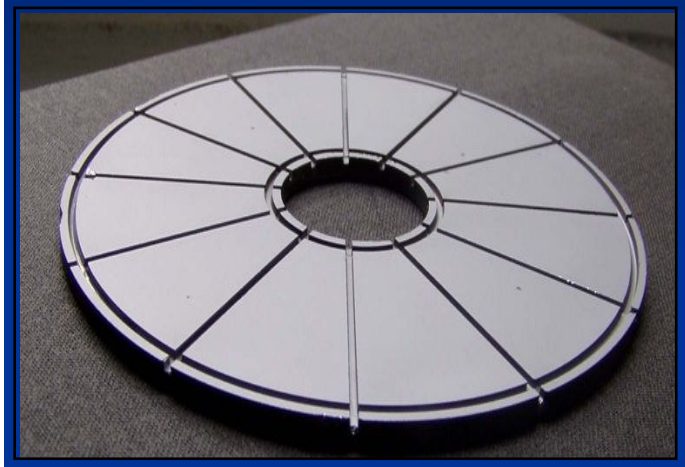
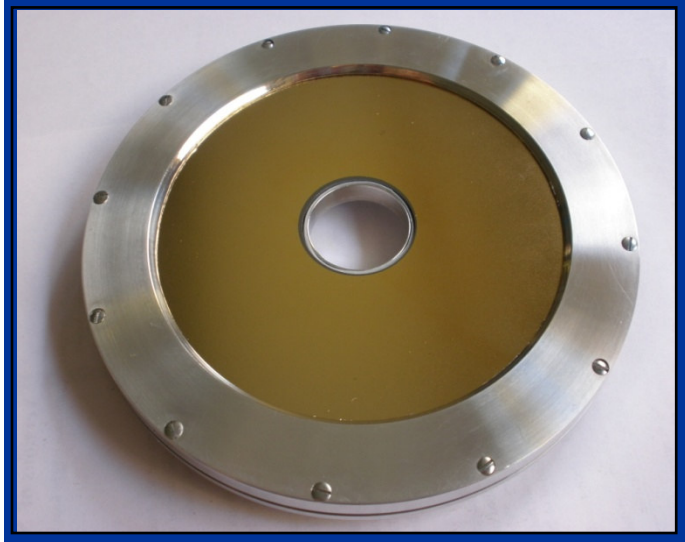
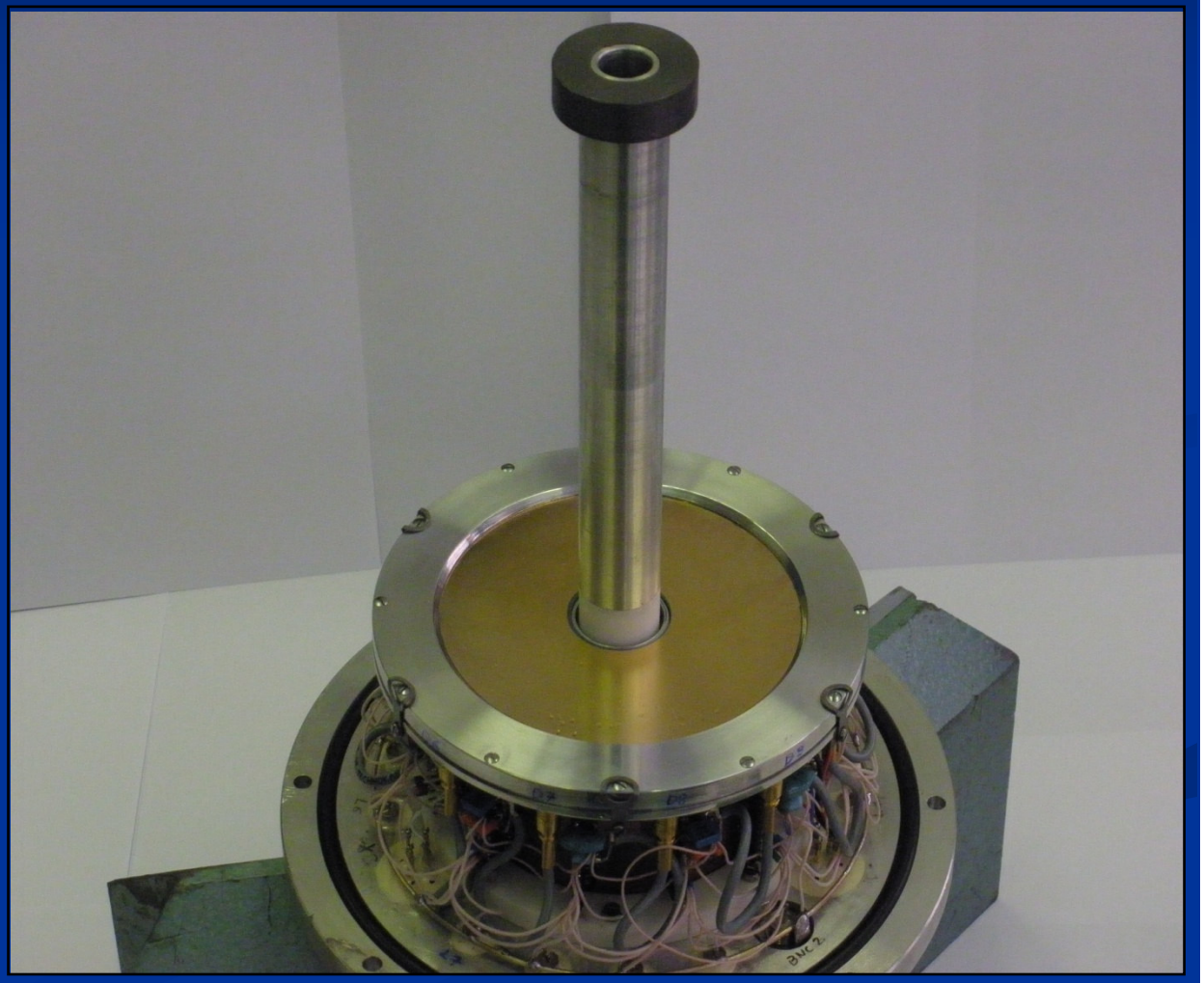
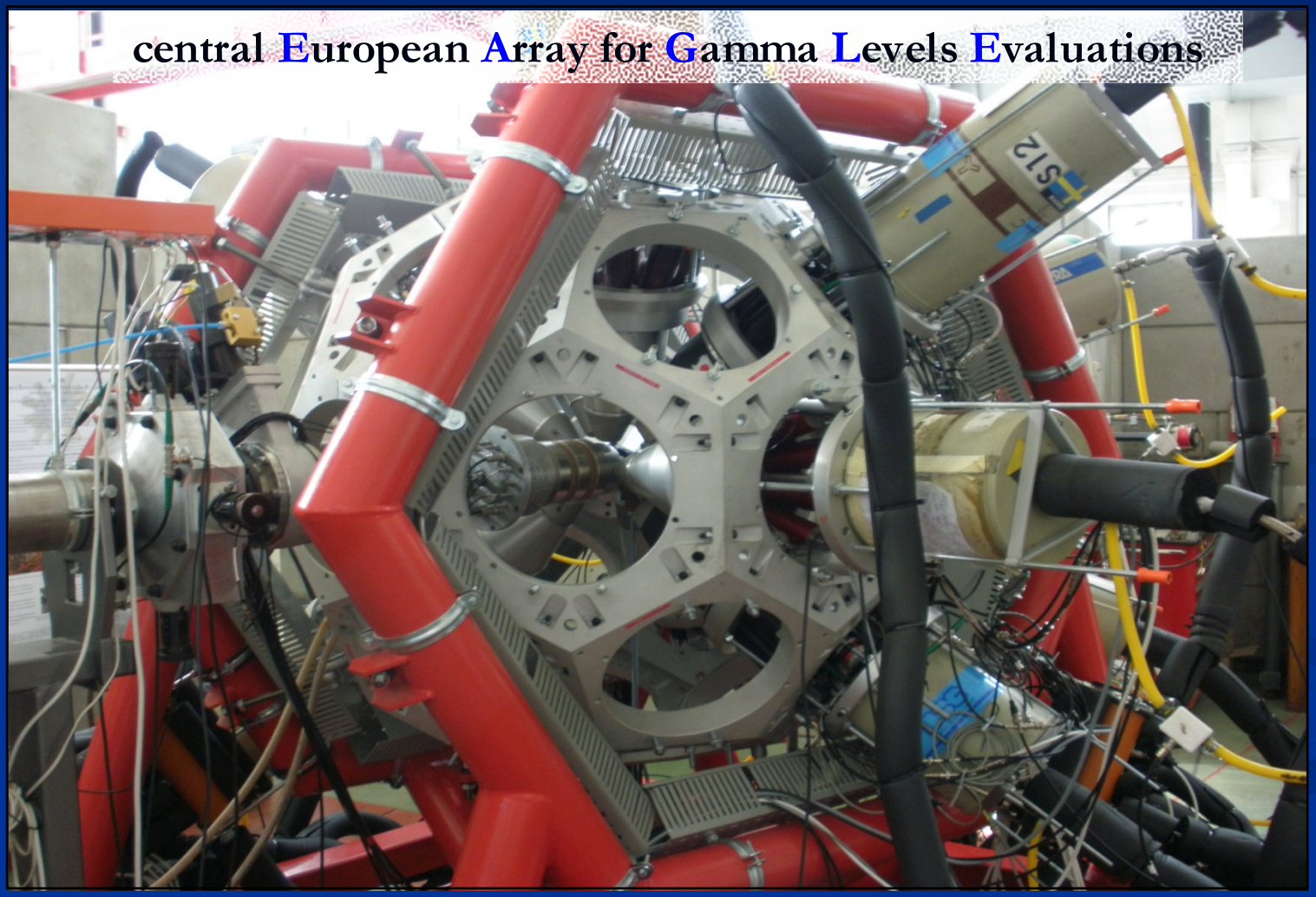
Upgrading the internal conversion electron spectrometer





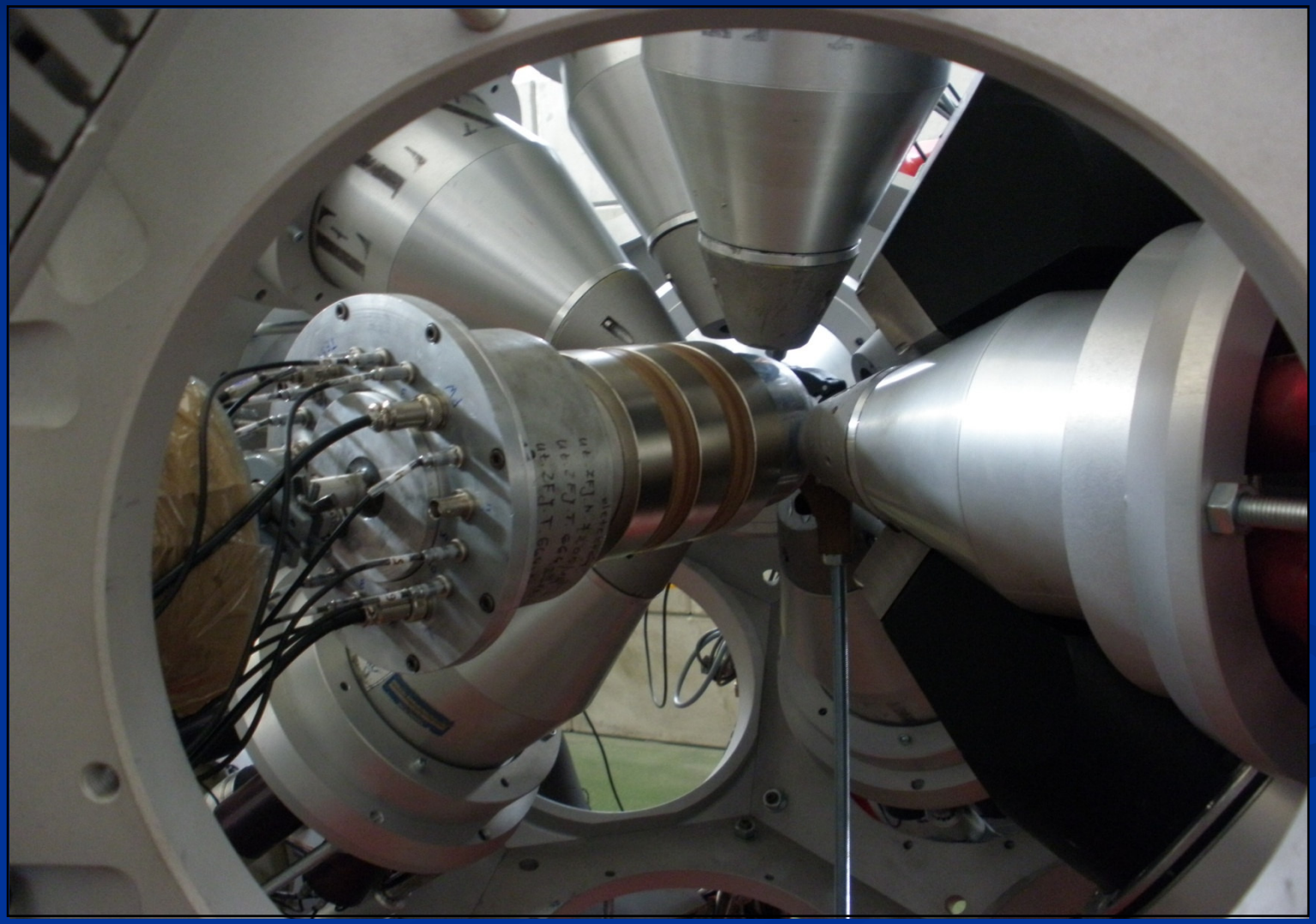


The unique experimental set-up the EAGLE + the ICE spectrometer



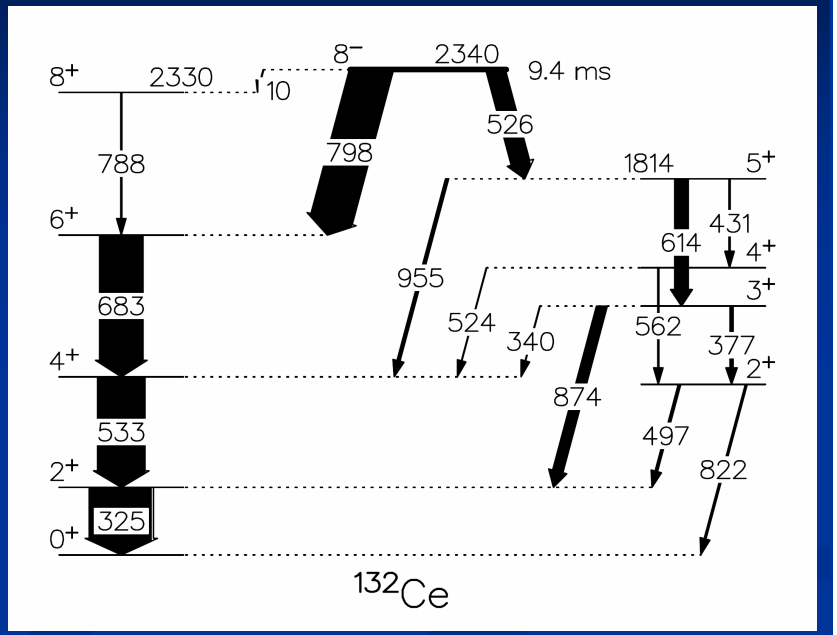
The EAGLE collaboration will receive 20 HPGe ACS from Gammapool (2011-2013).

The unique experimental set-up the EAGLE + the ICE spectrometer



Summary

- Absolute B(E3) and B(M2) transition probabilities for the γ-rays depopulating the $I^{\pi}=K^{\pi}=8^{-}$ isomeric state in ^{132}Ce were determined;
- Assignment of 5^{+} for level 1814 keV and 8^{-} for the $I^{\pi}=K^{\pi}=8^{-}$ isomeric state were confirmed by the pure E3 character of the 526 keV transition and E2 of the 614 keV;
- Our results can be helpful for the verification of various model predictions concerning the K-composition of the wave functions of the studied states.



Welcome to cooperate with us in study $I^{\pi} = K^{\pi} = 8^{-}$ isomers in nuclei for N=74 !!

Thank you for your attention!