# First results from Modular Total Absorption Spectrometer at the HRIBF (ORNL, Oak Ridge)

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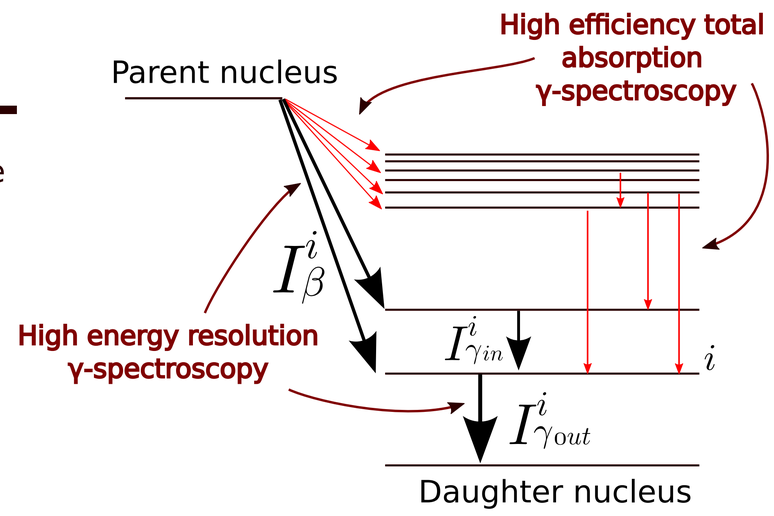
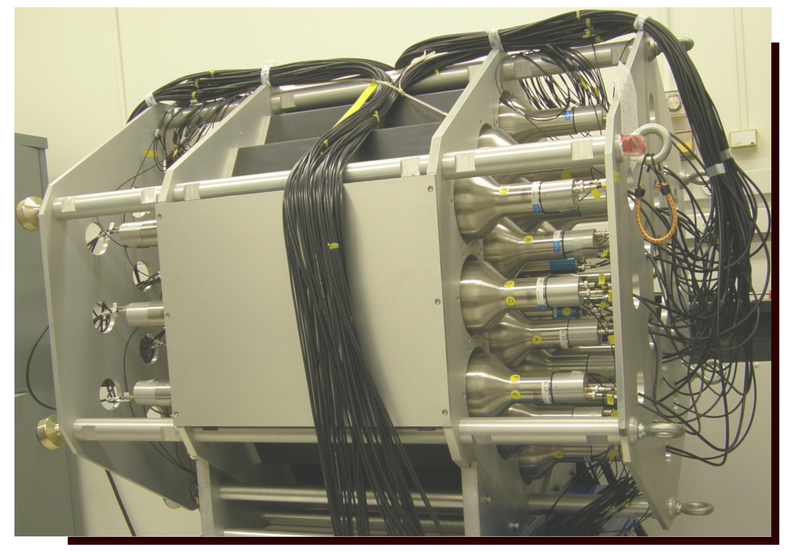
## Motivation

Beta decay scheme is derived from the observed gamma transitions

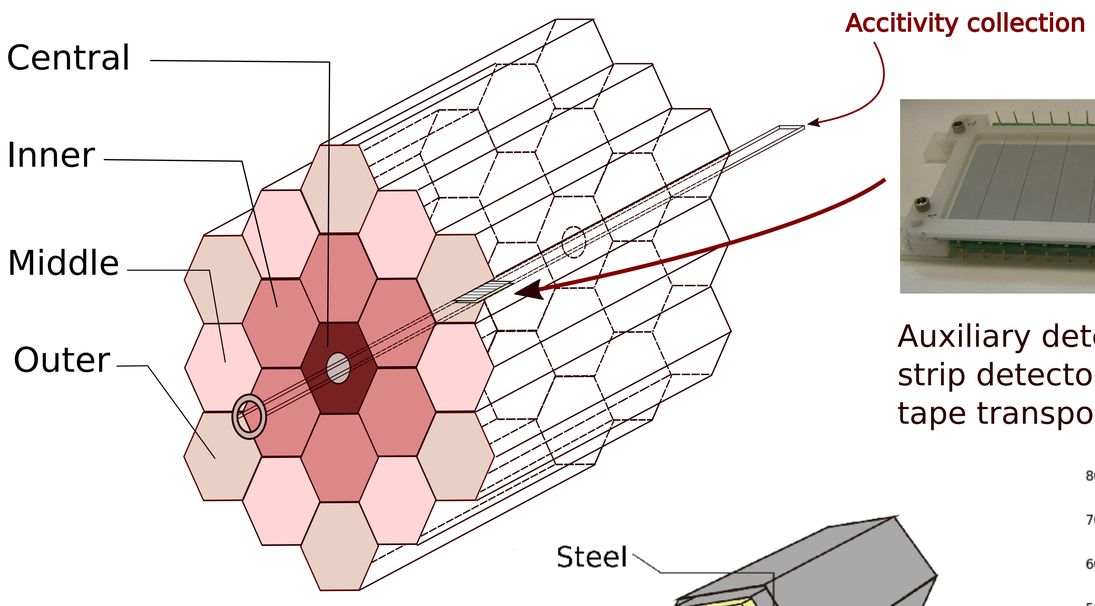
$$I^i_\beta = I^i_{\gamma out} - I^i_{\gamma in}$$

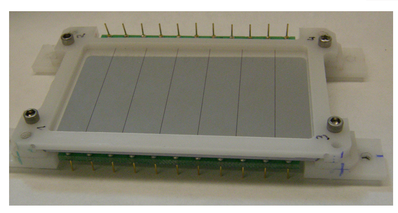
Unobserved gamma transitions feeding level $i$ lead to an incorrect intensity balance, resulting in underestimating of average gamma energy and overestimating of average beta energy per decay



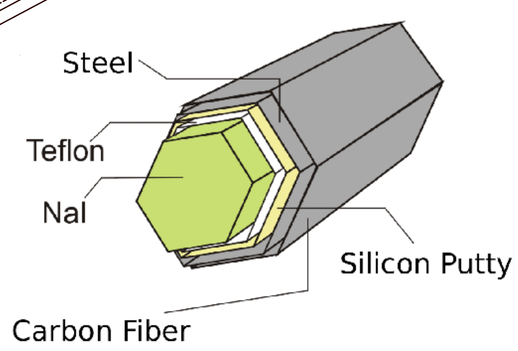



## Modular Total Absorption Spectrometer (MTAS)

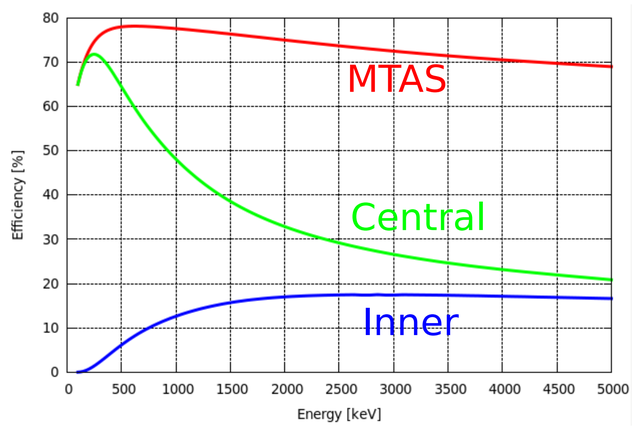


Auxiliary detectors include two 1 mm thick silicon strip detectors placed inside the MTAS around the tape transporting collected activity.

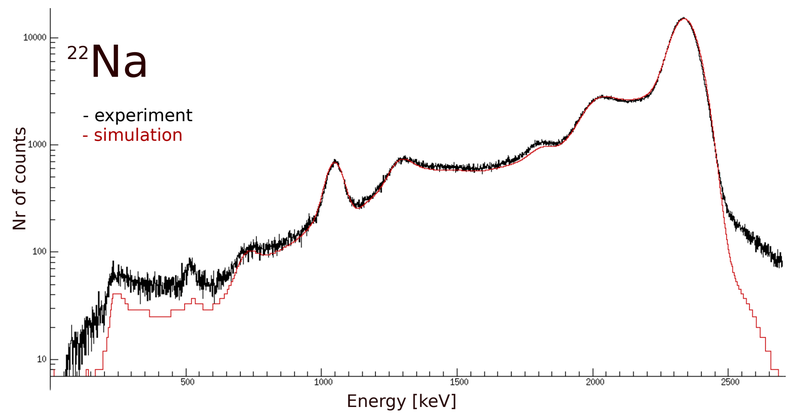



19 hexagonal NaI crystals. Diameter: 8" length: 21" each. 7 times larger volume then the largest previous TAS.

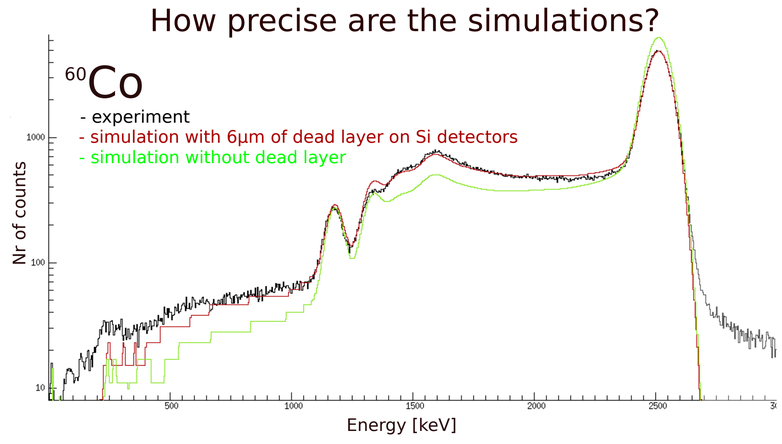



Simulated full energy gamma ray efficiency for Central detector, Inner ring, and all MTAS for complete MTAS array.

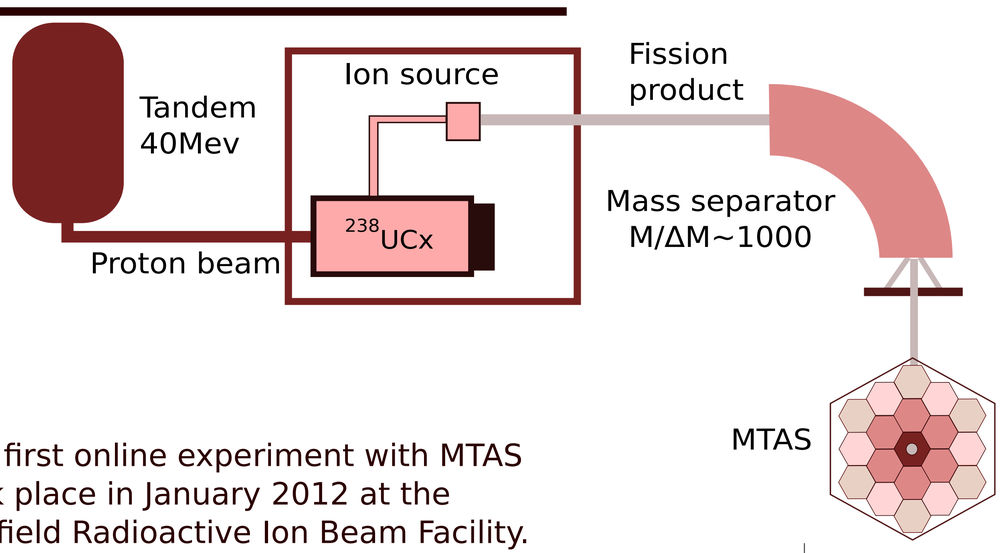
Response function - calibration sources



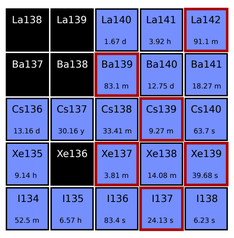

How precise are the simulations?




## Experiment

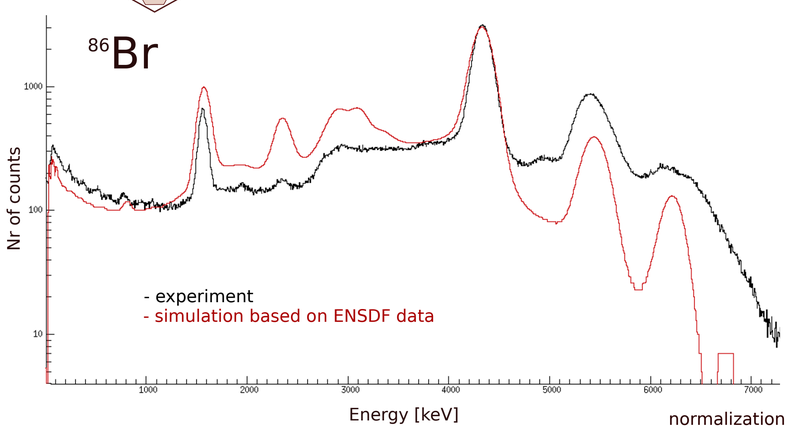


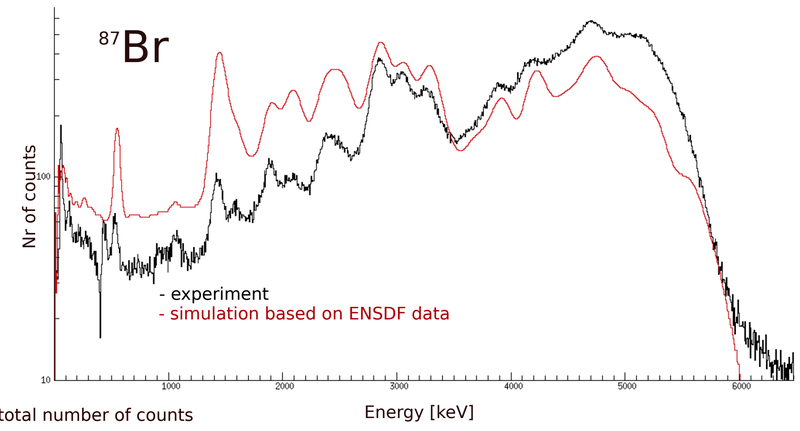

The first online experiment with MTAS took place in January 2012 at the Holifield Radioactive Ion Beam Facility.



The decays of over twenty $^{238}$U fission products, including $^{86}$Br and $^{87}$Br, have been studied.

The large excess of measured intensities for high-energy gamma radiation can be seen from the comparison of experimental and simulated MTAS spectra.




normalization to total number of counts