Measurements of Gamma Rays from ^{7}Be and ^{7}Li Inelastic Scattering

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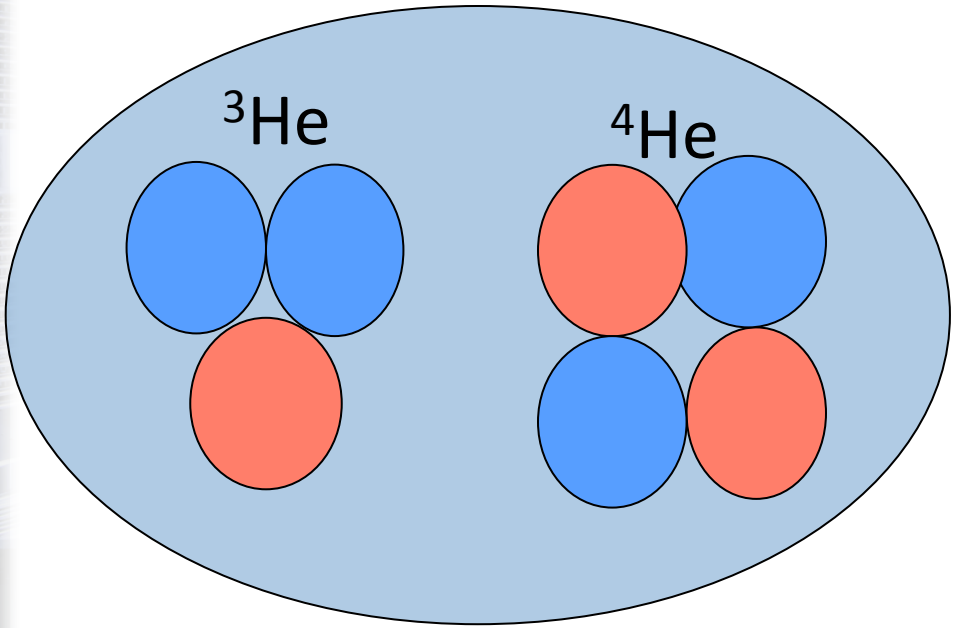
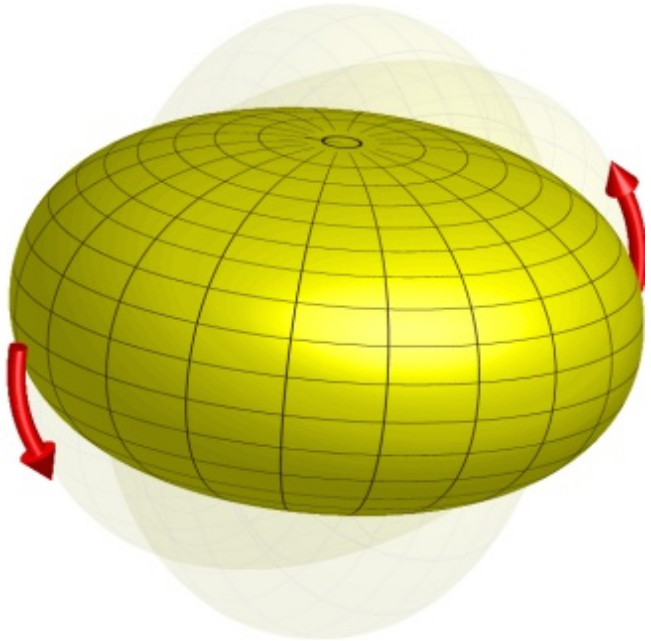
Physics Motivation

- Investigating cluster description of ^{7}Be
- Opportunity to compare to no-core shell model.





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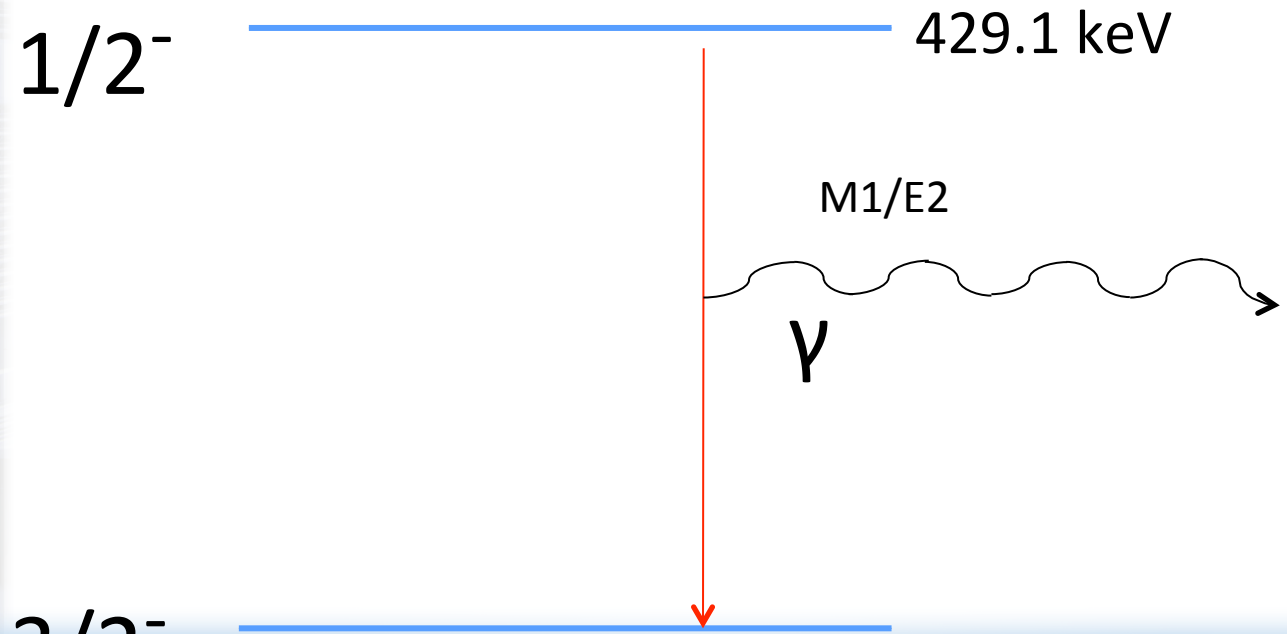
^{7}Be Level Scheme

- Mixed Transitions present in ^{7}Be and ^{7}Li
- ^{7}Li E2 strength is known (7.59 $e^{2}fm$)
- ^{7}Be E2 percentage has yet to be measured



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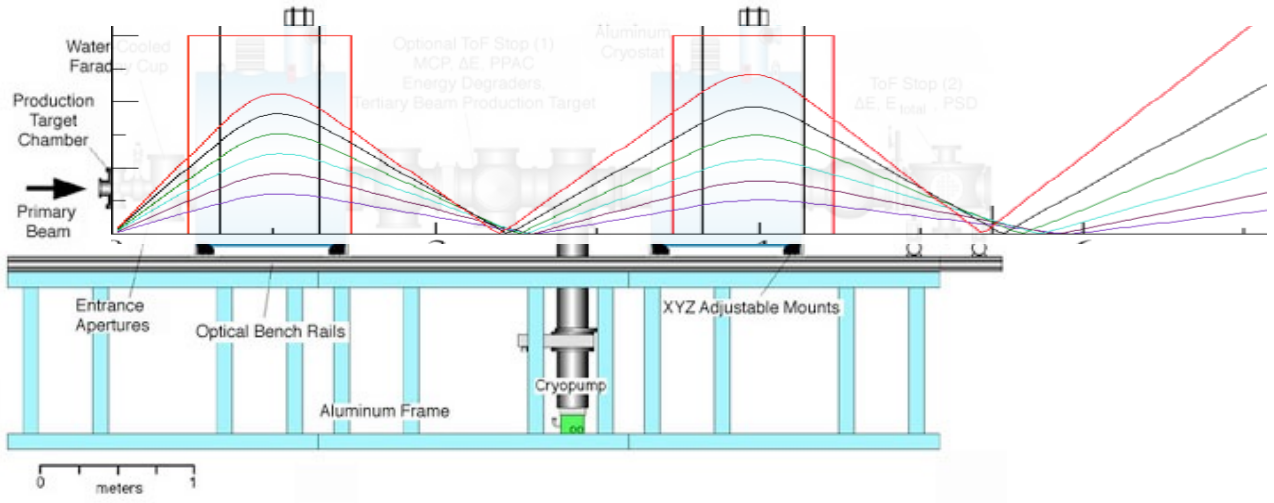
Experimental Challenges

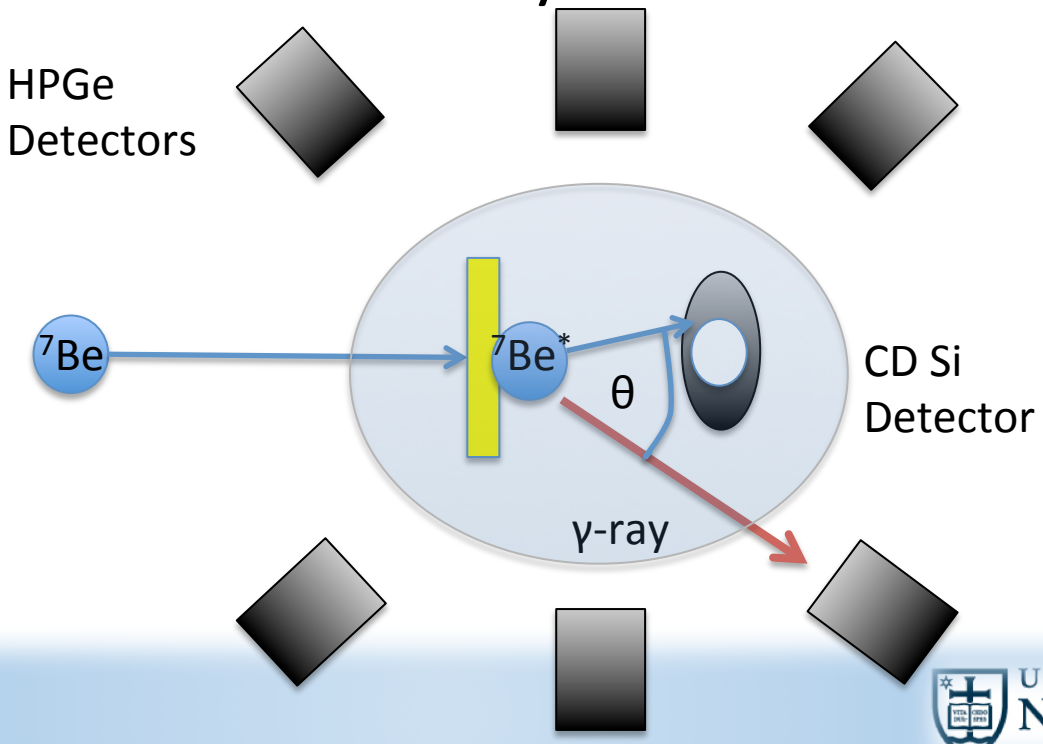
– Coulex to excite via E2 only

– TwinSol at ND to make light, radioactive beams



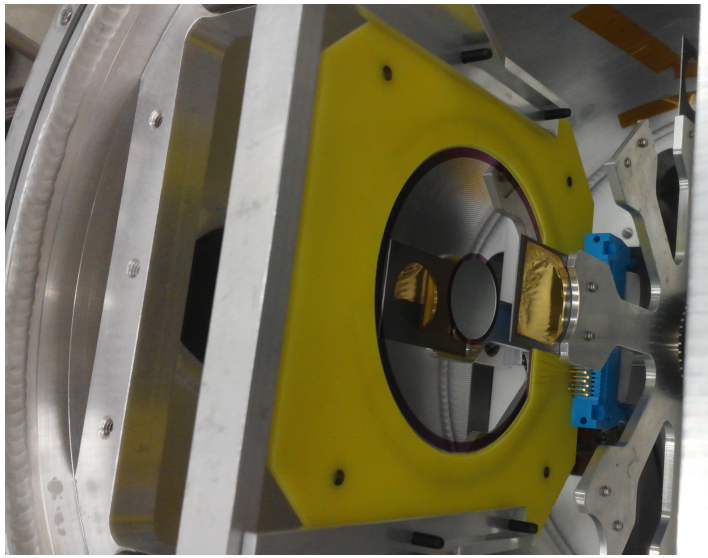
Experiment Specifics

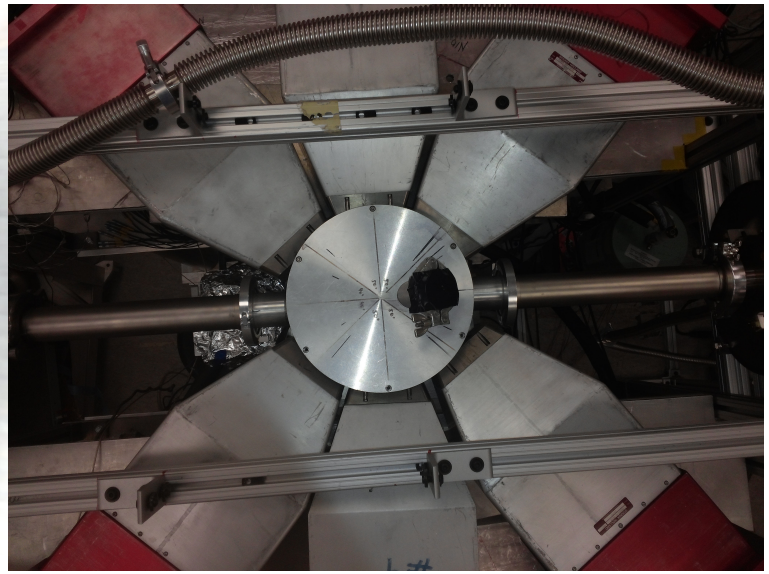
- $^{2}H(^{6}Li, ^{7}Be)n$ with ^{6}Li at 34 MeV
- ^{7}Be rates at $1.4x10^{5}$ particles/s over 3.5 days
- ^{7}Li beam also run for analysis check



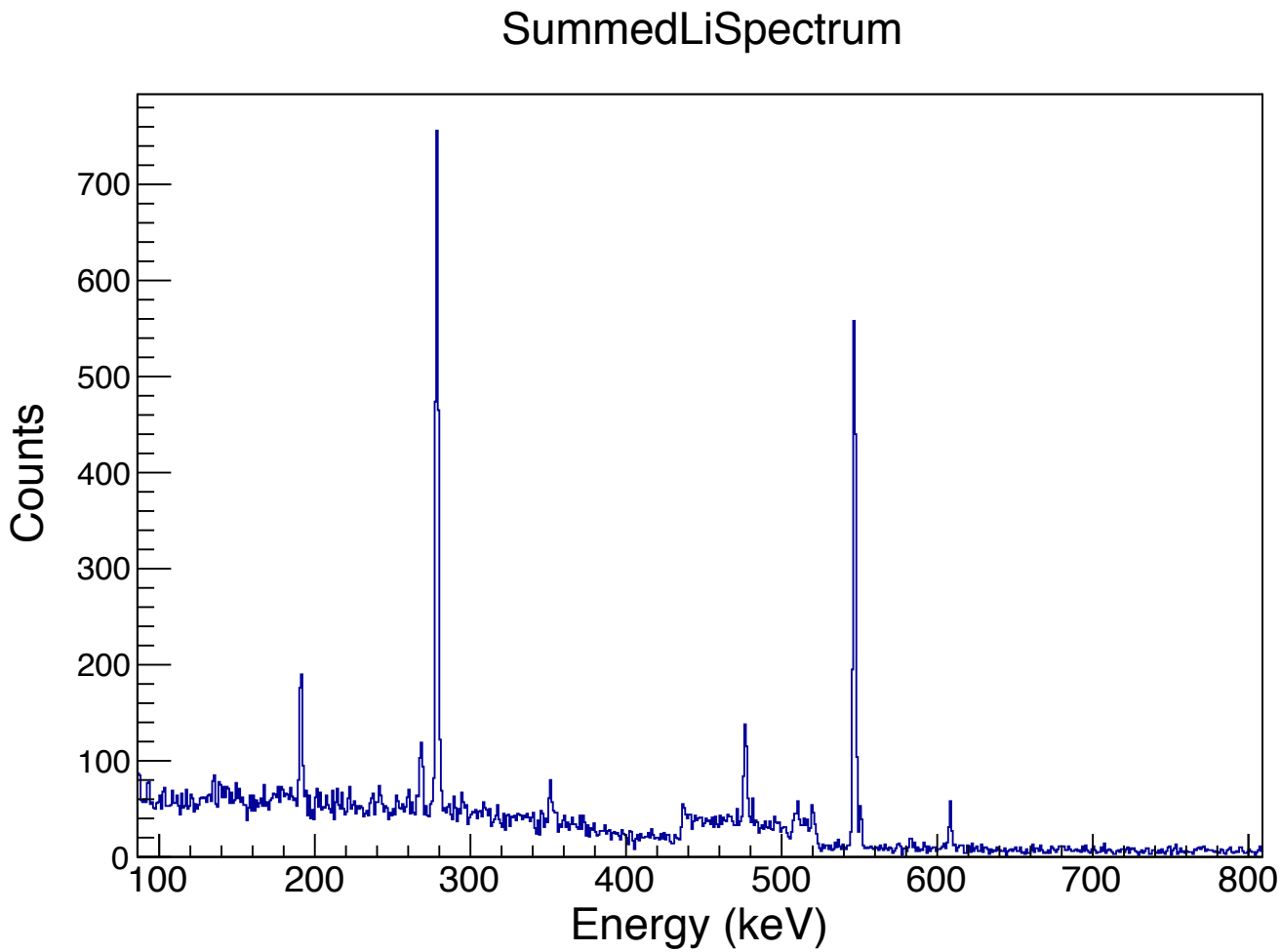
Experimental Set up

- HPGe detectors gated on CD detector
- BGO detectors to suppress Compton background

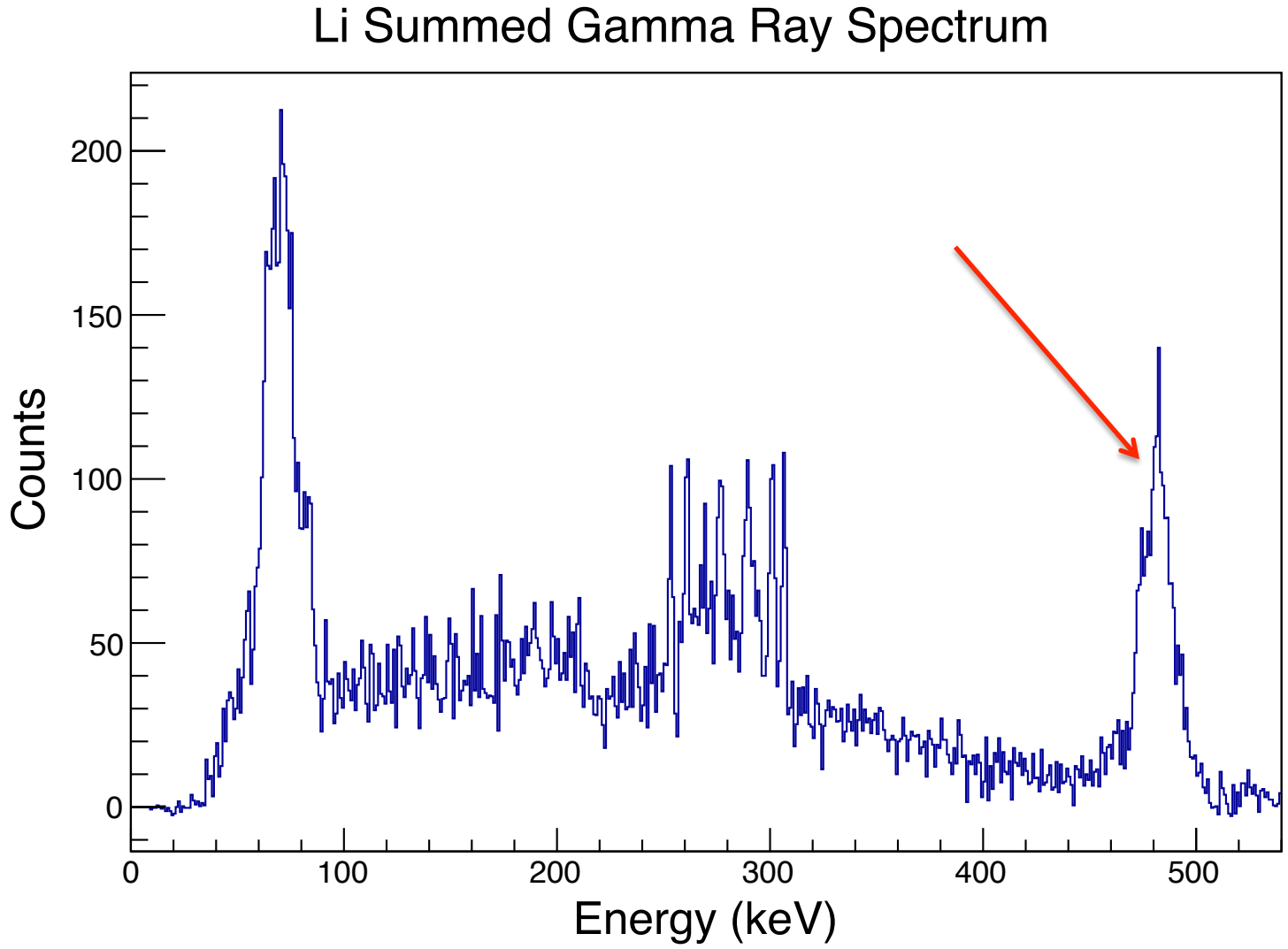




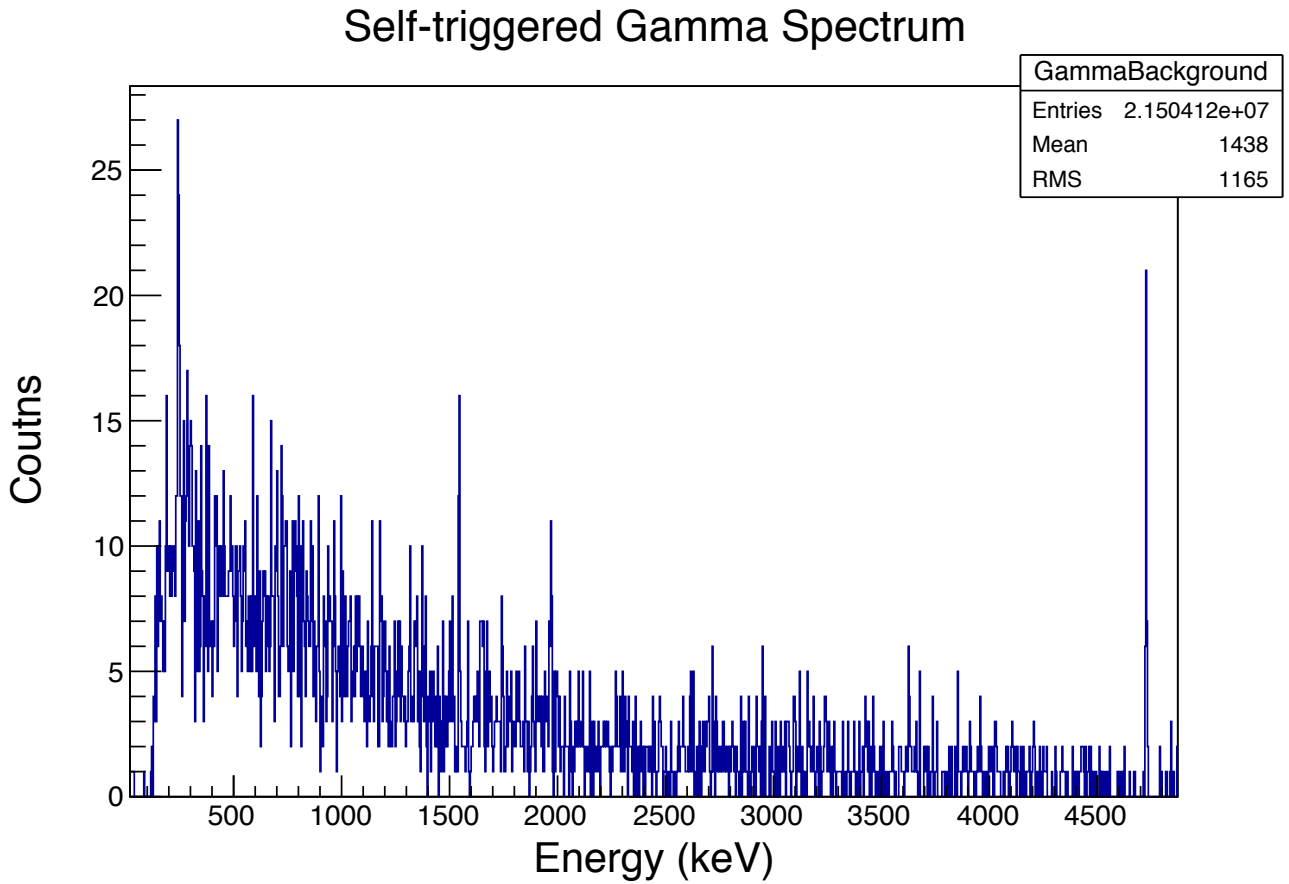
Summed and Gated Spectrum



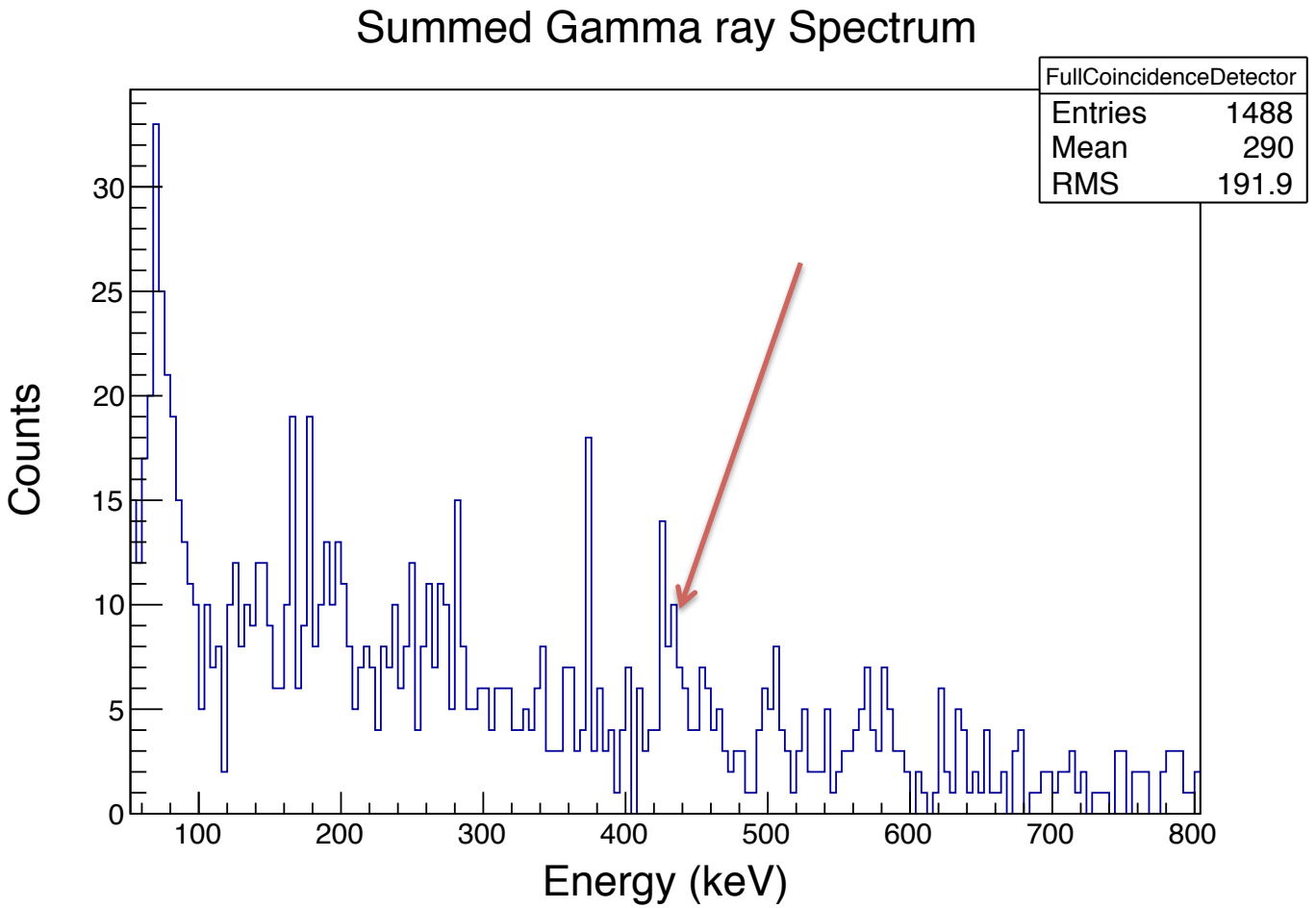
Post Doppler Correction



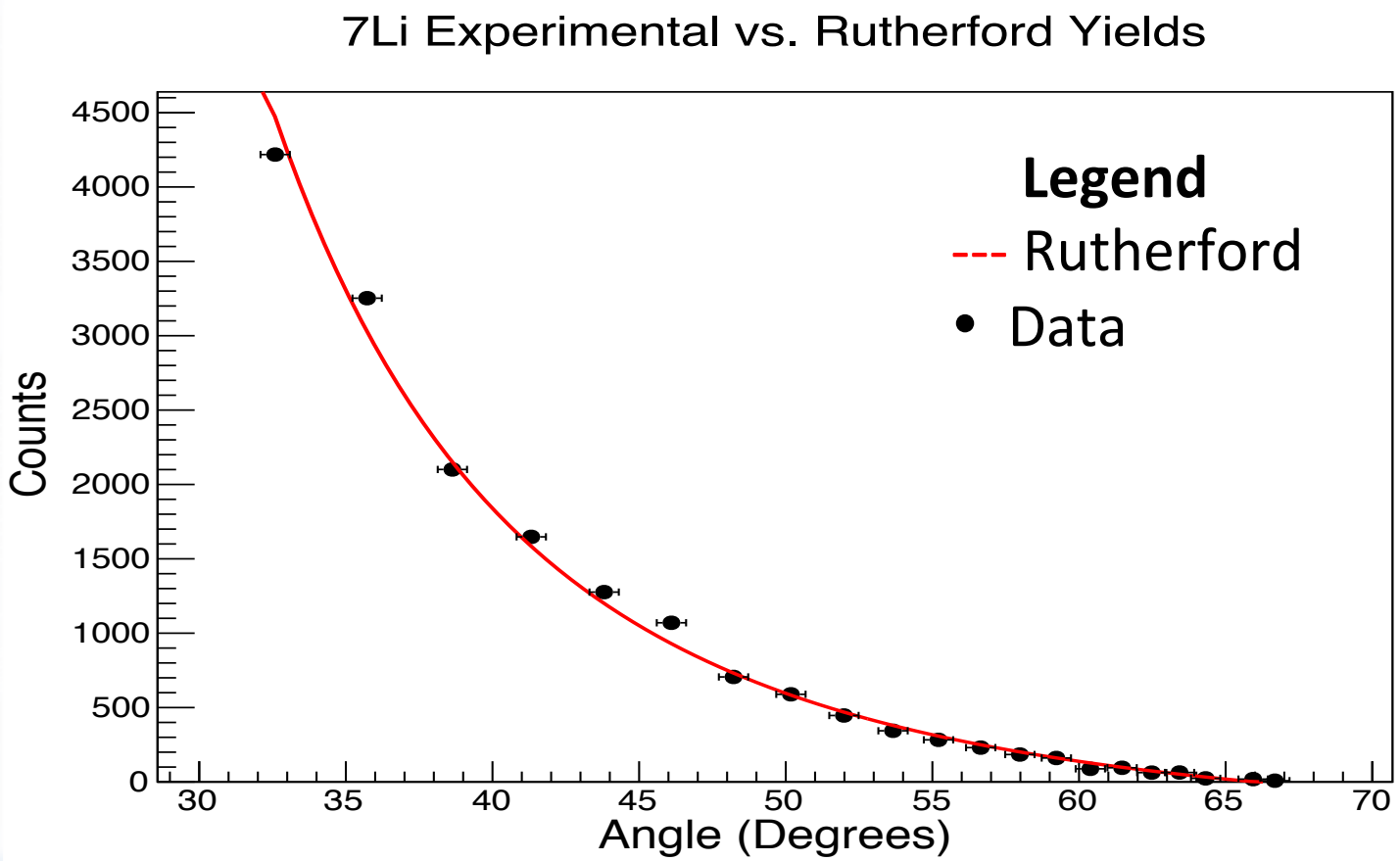
Initial 7Be Spectrum



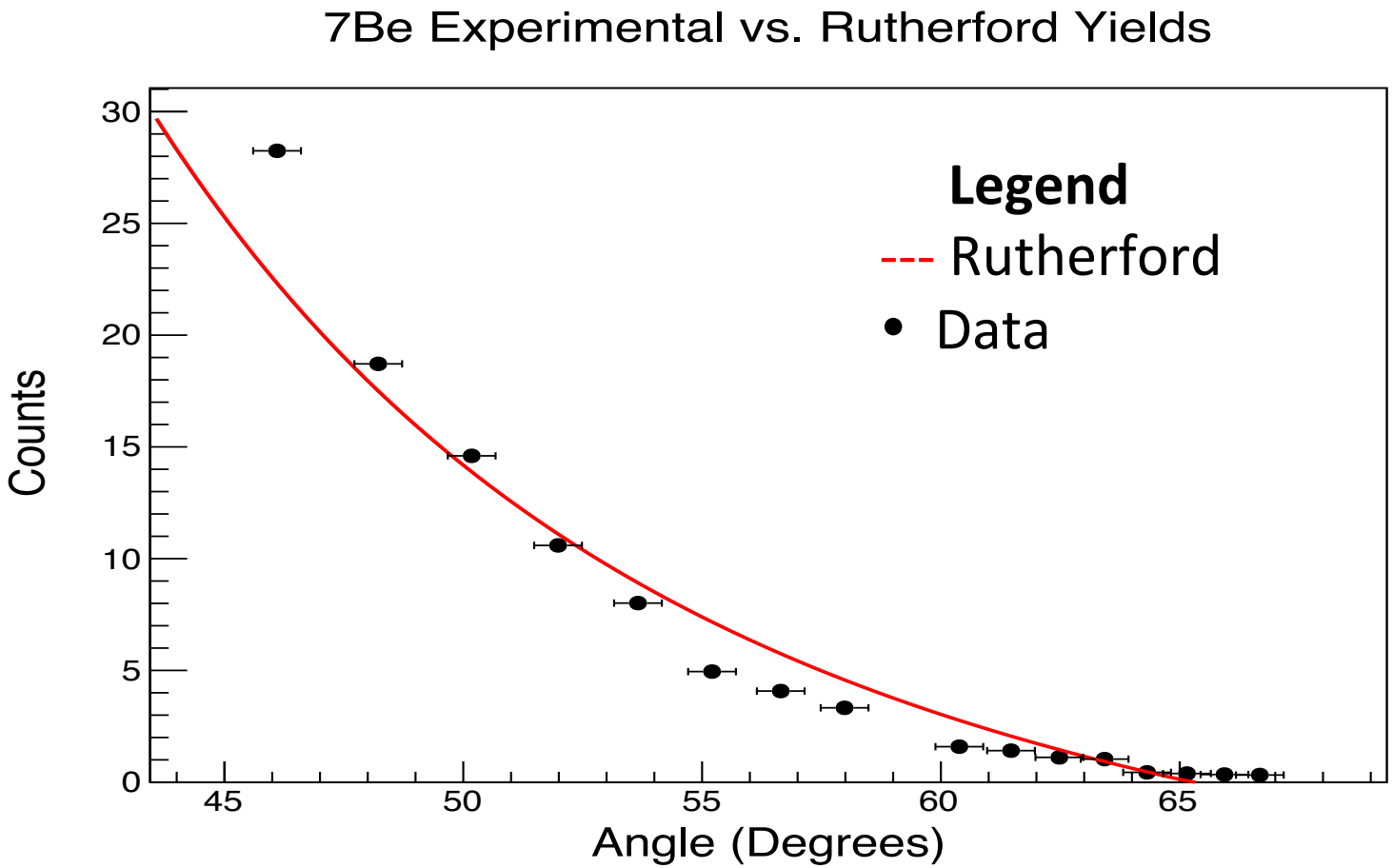
Final ^{7}Be Spectrum



^{7}Li Yield to Cross Section



^{7}Be yield to cross section



Preliminary Results

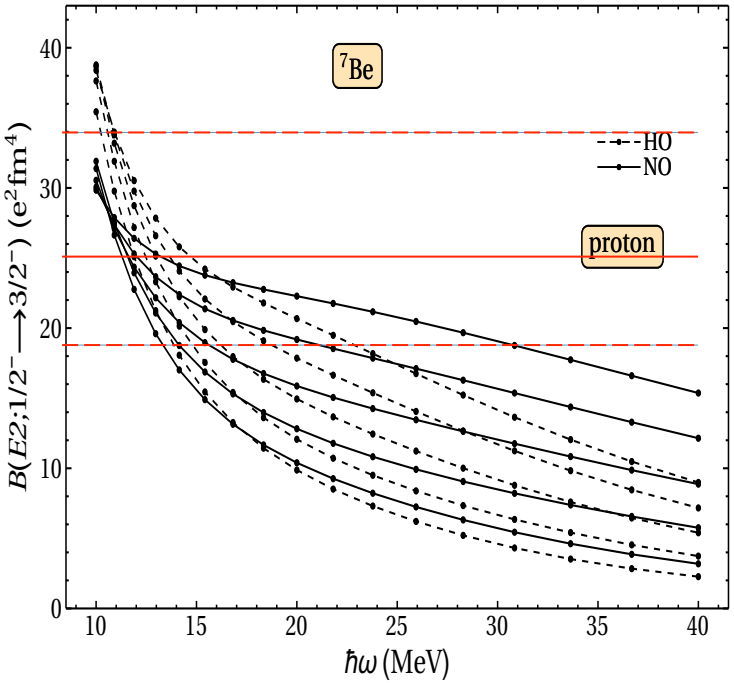
- Integration yields 45±10 counts in ^{7}Be peak (Statistical Error only)
- Winther and de Boer scattering code to go from cross section to B(E2)
- B(E2) of $25.0^{+9.2}_{-6.5}$ e^2 fm^4 for 7Be
- B(E2) of $3.28^{+.017}_{-.016}$ e^2 fm^4 for 7Li

Theoretical Comparison

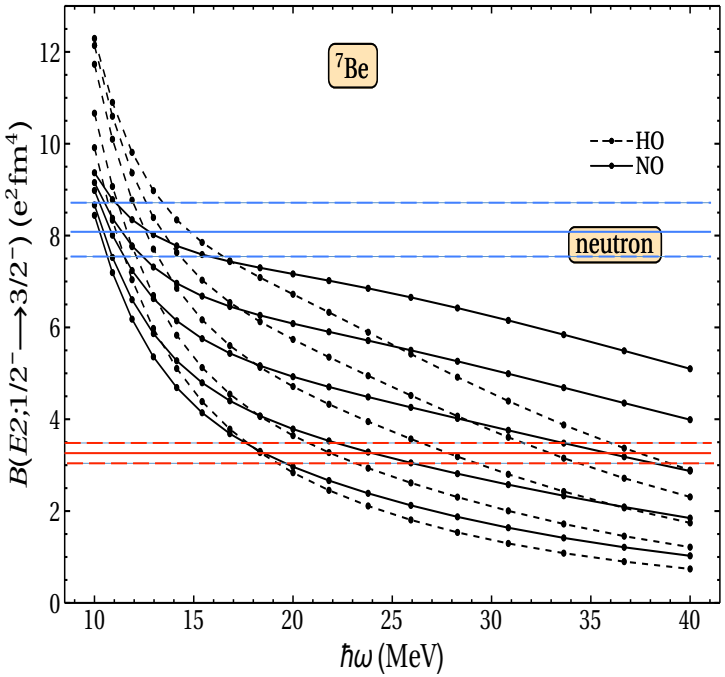
7Be: E2 transition

7Li: E2 transition

PRELIMINARY RESUTS IN RED



Courtesy of Ch. Constantinou et al. (DNP16 CG.1)



HO= Harmonic oscillator basis

NO= Natural Oscillator basis

New Measurement

Literature Value

Conclusions

- Investigated new type of experiment with TWINSOL
- Future work in geant4 simulation, gold coulex to better describe beam
- Investigate future 8Li experiment

Acknowledgements

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