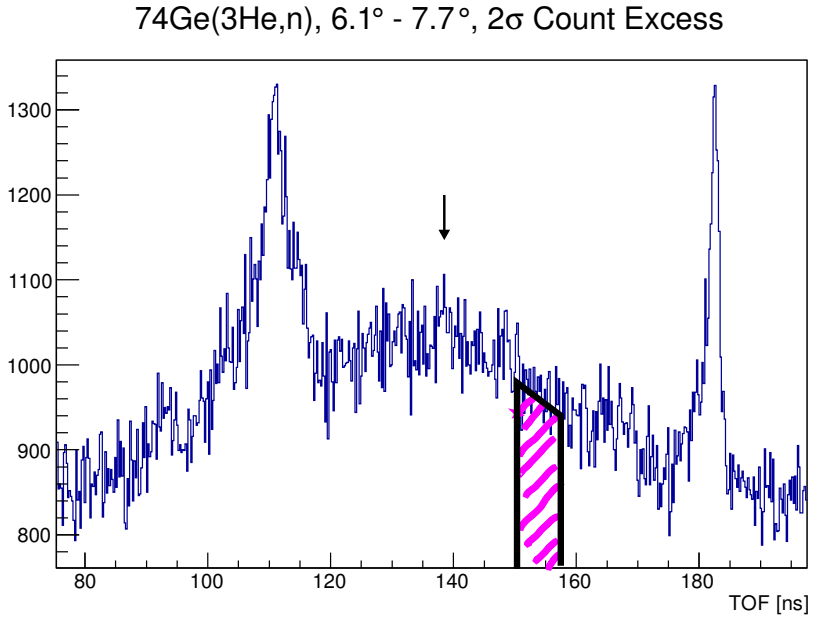
Searching for excited 0^+ states

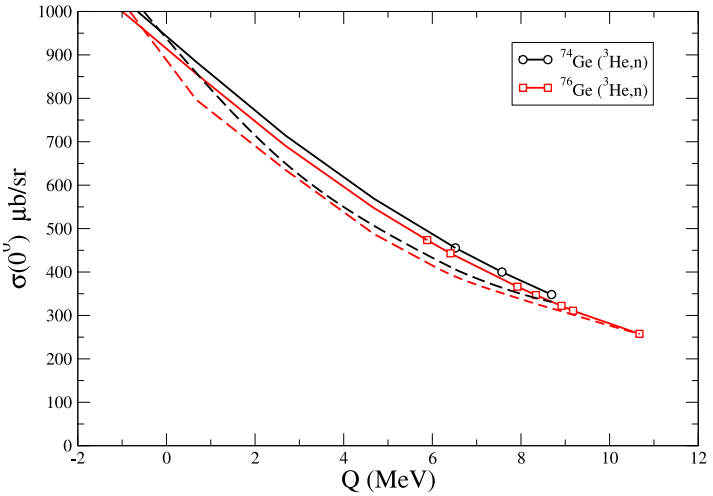


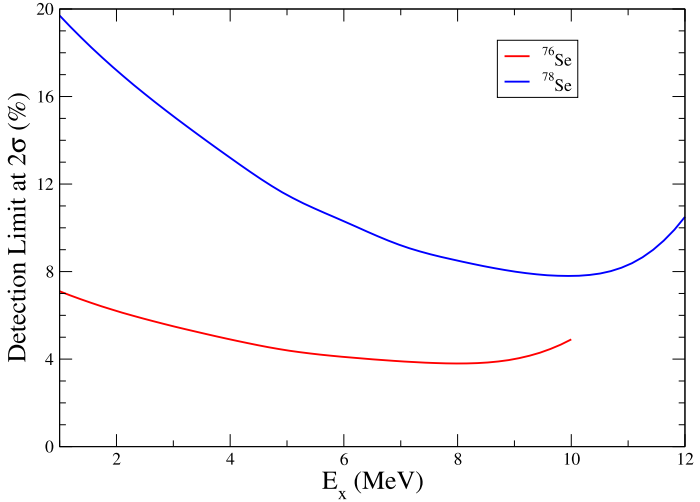
$$S = P - B = i\sigma_S$$

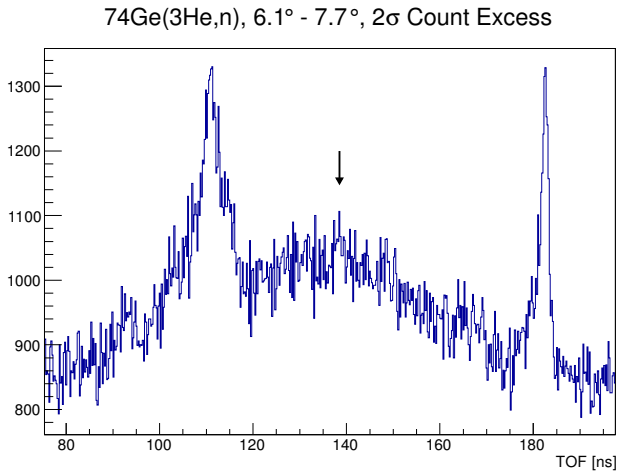
$$\sigma_S = i\sqrt{P + B} \approx i\sqrt{S + B + B} = i\sqrt{S + 2B}$$

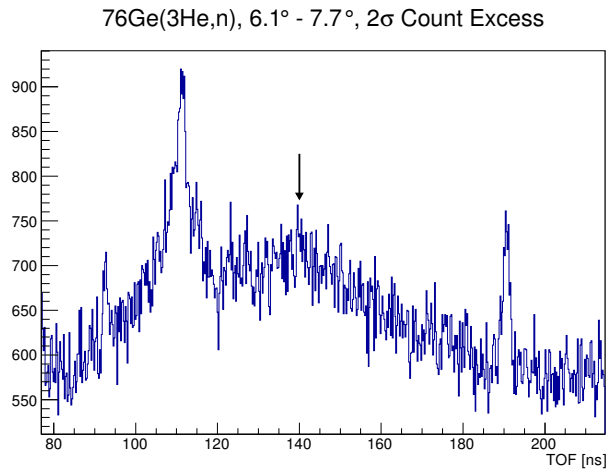
$$S = \frac{i^2 \pm \sqrt{i^4 + 8i^2 B}}{2}$$

Limits on excited 0^+ states

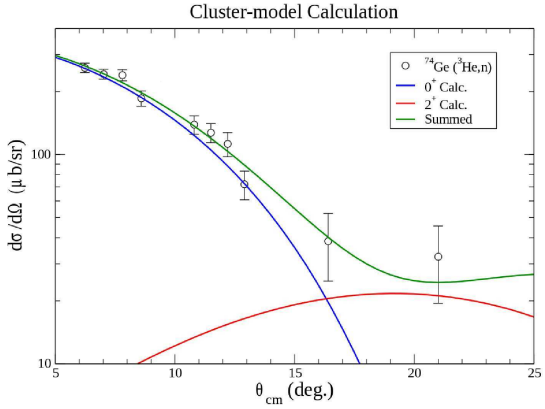


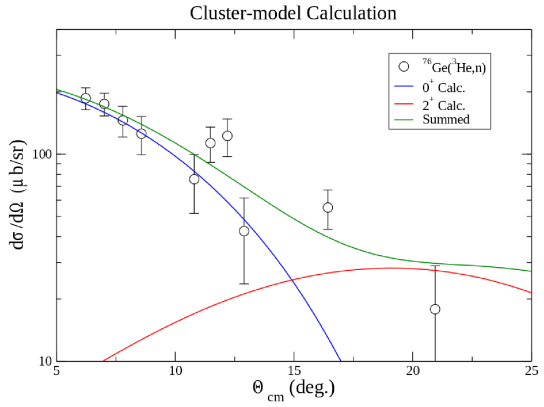






Zero-degree cross section



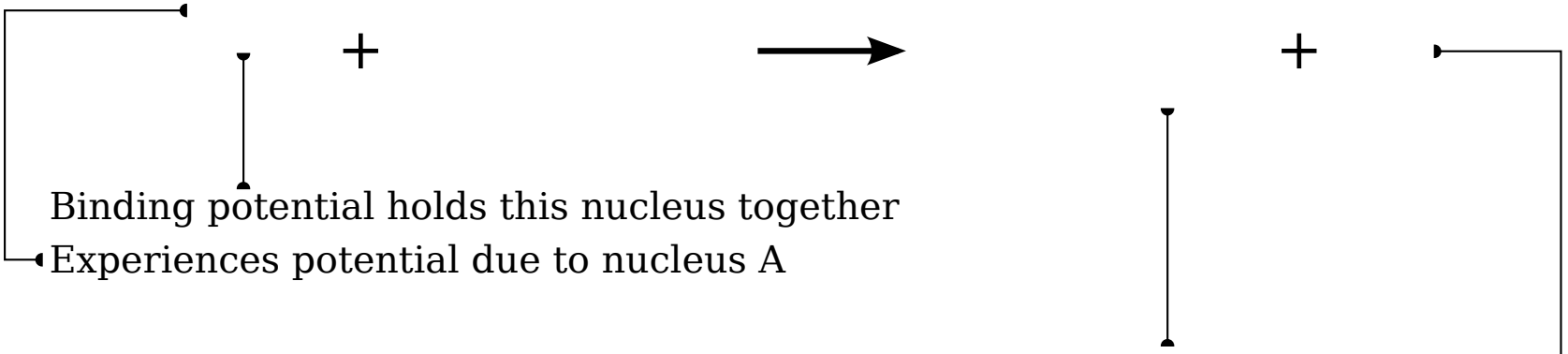


- The zero-degree cross section for 76Ge(3He,n) is ~70% less than that of 74Ge(3He,n)

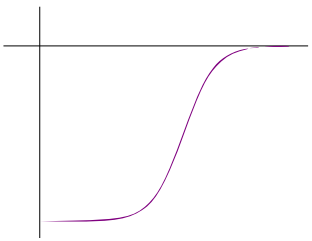
Excited 0+ states are not seen for either target

? Is the difference in cross-section expected?
Or is somethiing wrong with the previous analysis?

Understanding the cross-section with DWBA



$$U(r) = V_C - V f(x_0) + \left(\frac{h}{m_\pi c}\right)^2 V_{SO}(\sigma \cdot l)\frac{1}{r}\frac{d}{dr} f(x_{SO})$$



$$-i[W f(x_W) - 4W_D \frac{d}{dx_D} f(x_D)]$$

In conclusion

- No excited 0+ states populated through (3He,n) have been found in 74Ge or 76Ge.

The extrapolated zero-degree cross section is in agreement with the trend predicted by DWBA.

The ground state of 76Ge appears to be well-described by a BCS state.

Data is needed for other candidate nuclei!

Thanks

To my advisor, Jim Kolata, who sometimes seems to be nuclear physics incarnate,

To the excellent post-docs Anthony Villano and Alan Howard, who introduced me to version control and ROOT,

To all my friends, who are the most amazing friends ever.