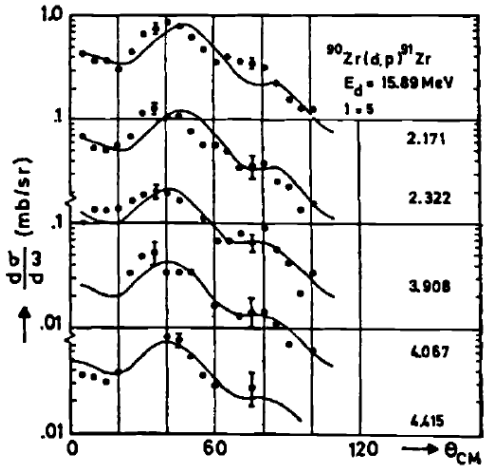
Name: _____ PHYS 7501, FS 2017

Homework 6 **Due:** Start of class, November 16th

1. At what center of mass angle are we most likely to detect protons from the ^{90}Zr(d,p) reaction for a 15.9MeV deuteron corresponding to a $l = 5$ transfer?
   Compare to the result from Blok et al. Nucl. Phys. A (1976).



2. Consider an experiment where your ion beam will only lose a little bit of energy in the target (i.e. it's a "thin" target). First, you impinge the ion beam on the target at an energy somewhat below the resonance energy and you measure the reaction product yield (e.g. number of γ-rays). Then, you repeat this measurement for subsequently higher beam energies, ultimately measuring the yield well beyond the resonance energy. Sketch the expected yield versus center-of-mass energy, labeling the resonance energy. Other than the resonance energy, what else can we learn about the resonance from this yield curve?

3. Consider a resonant (α,p) cross section where, for this particular resonance, $\Gamma_\alpha \gg \Gamma_p$ and $\Gamma_{total} \approx \Gamma_\alpha + \Gamma_p$. Which of these three quantities has the biggest impact on the cross section for this resonance? Why?

4. Calculate and plot the expected neutron energy distribution resulting from ^{103}Rh(p,n) for 5.3MeV protons. Compare the peak neutron energy to that determined by Bramblett & Bonner Nucl. Phys. (1960). Any thoughts as to why the distribution width for your calculation isn't quite right?