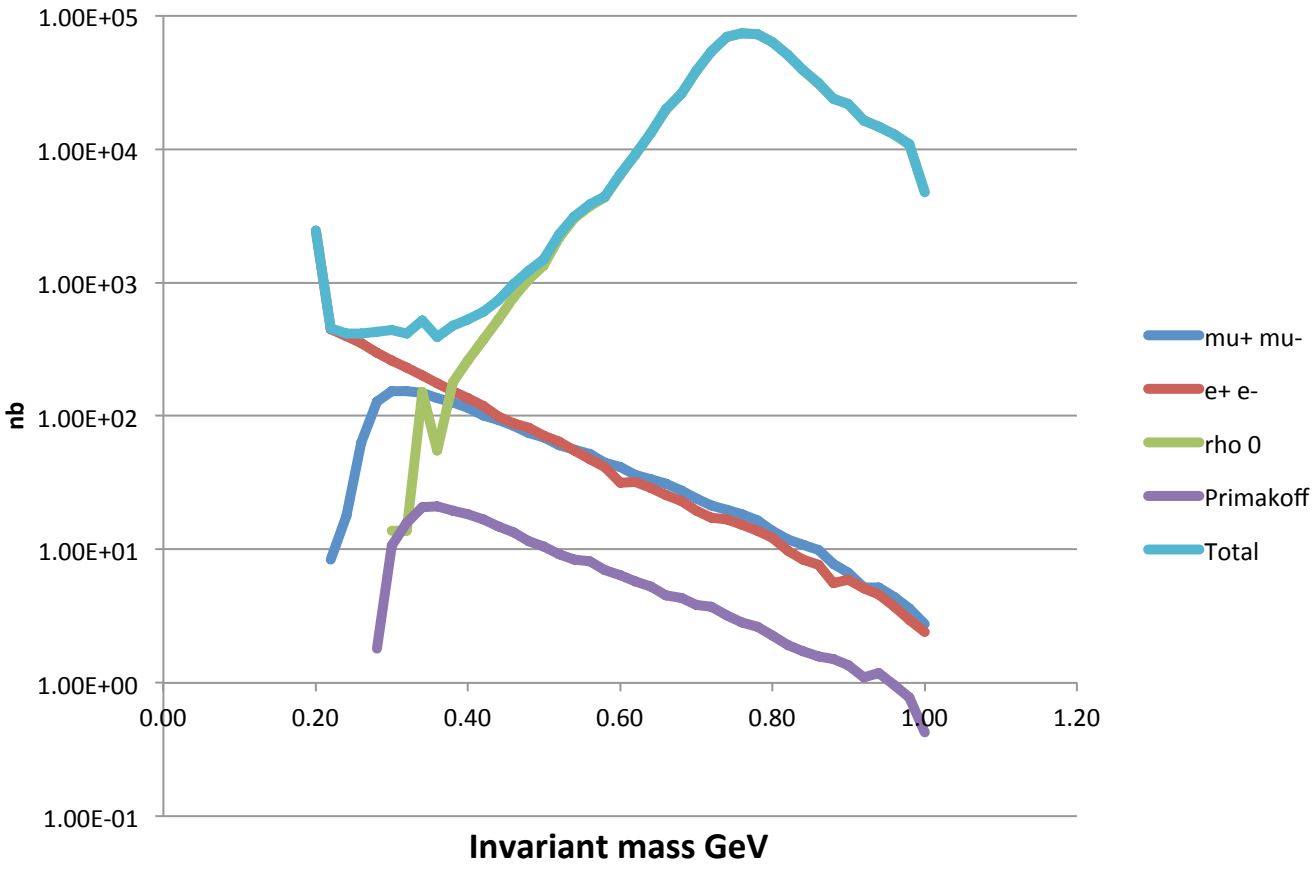
Update on MWPC construction

- All of the preamp electronics have been tested, and all of the PCBs attached to the 8 MWPC frames. The MWPCs are on wheels and can be moved around easily.
- Moved our operation into a new laboratory space and clean room. We're getting things set up.
- Walt has been busy, and hasn't found time yet to make a prototype metal shielding box for the MWPC preamp electronics
- Next steps:
  i. Install carbon tubes and adjacent field wires in the central region, HV test, fix problems. Do this for all 8 detectors first.
  ii. Then install the remaining sense and field wires, HV test, and fix problems.

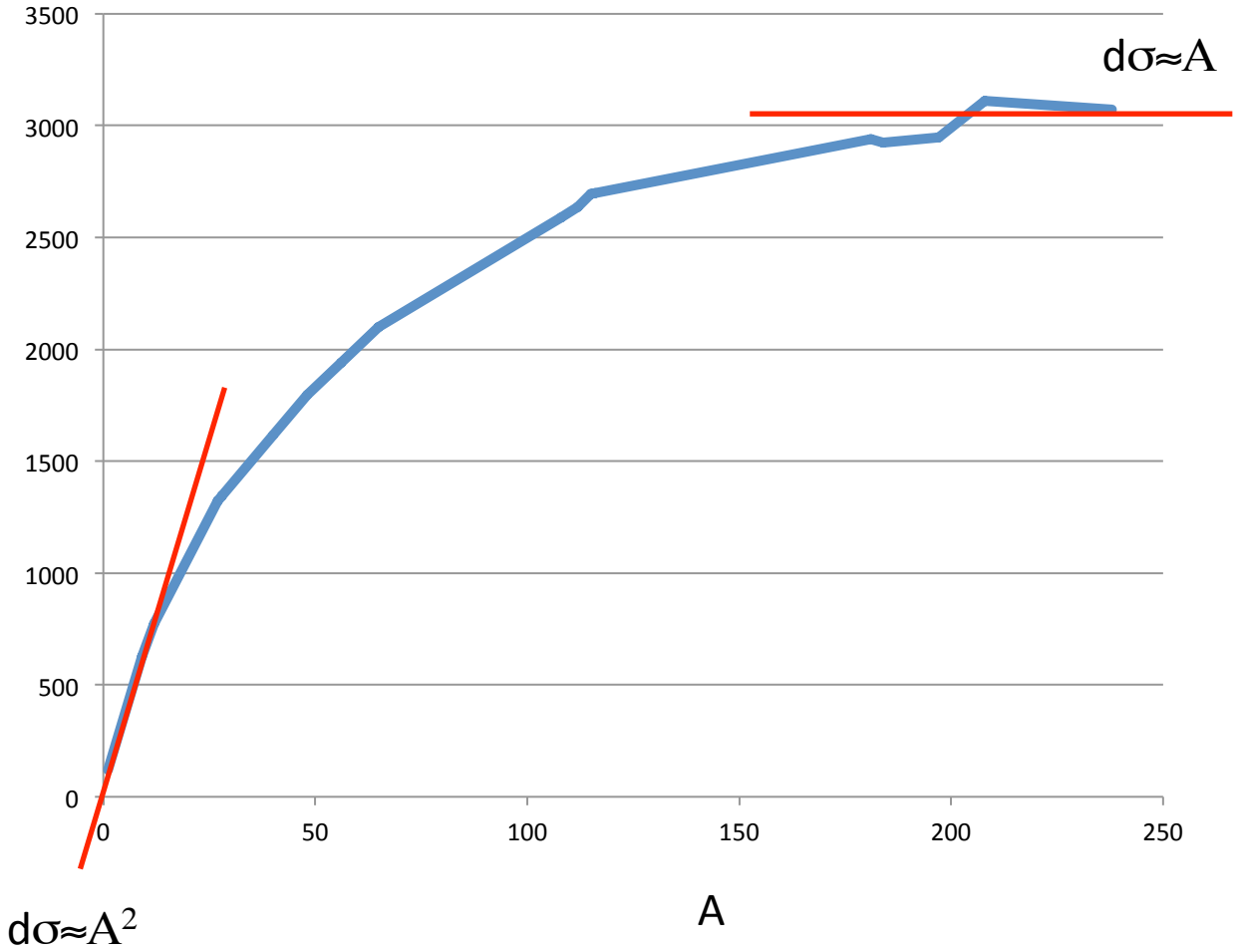
Target studies for CPP

Pair production, ρ^0 and Primakoff cross sections on proton for GlueX running conditions with track going into TOF

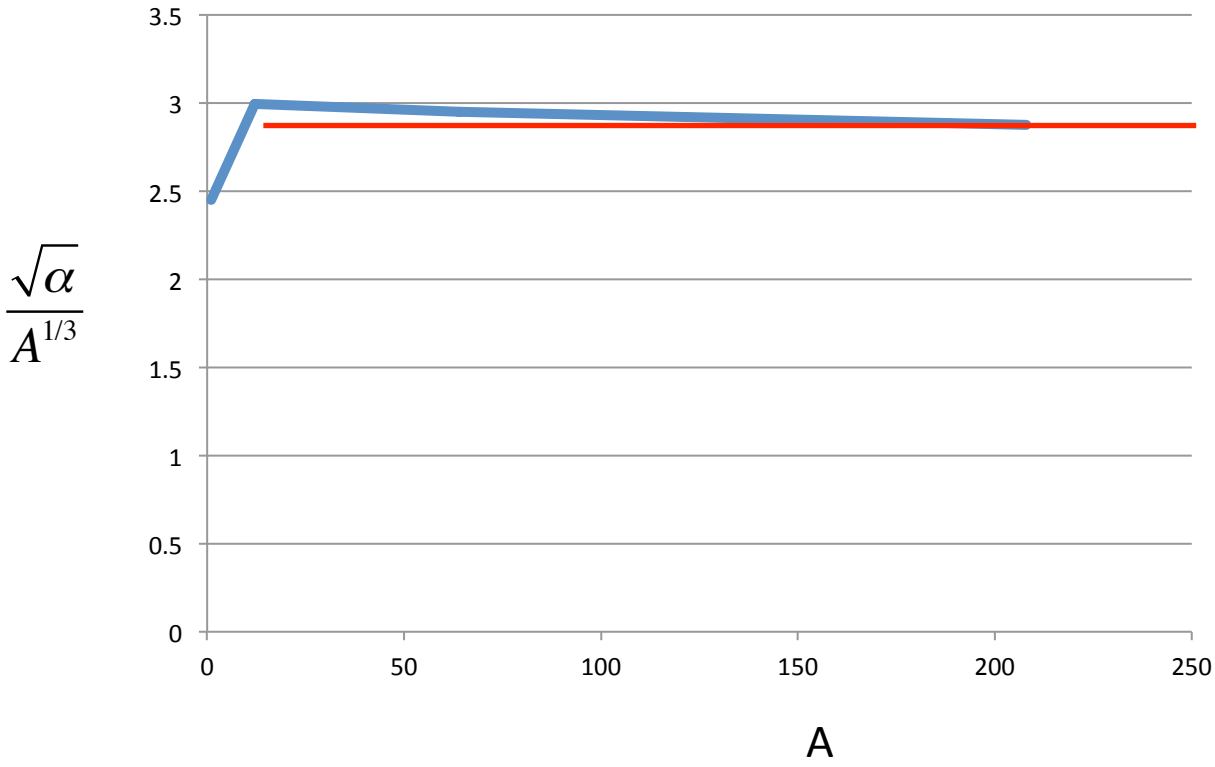


$$\frac{d\sigma_{\gamma A\to\rho}(t)}{dt} \cong \frac{d\sigma_{\gamma A\to\rho}(t_{\min})}{dt} e^{-\alpha t}$$

$$\frac{\dfrac{d\sigma_{\gamma A\to\rho}(t_{\min})}{dt}}{A}$$

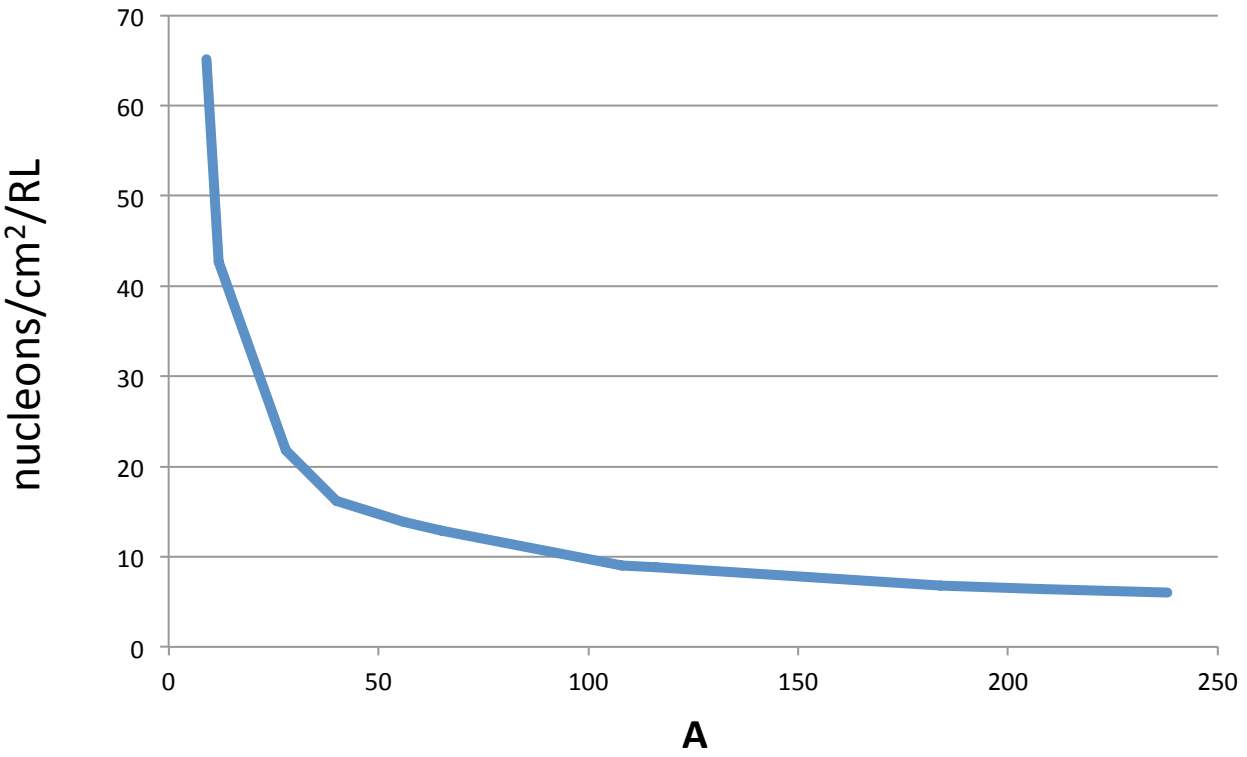


$$\frac{d\sigma_{\gamma A\to\rho}(t)}{dt} = \frac{d\sigma_{\gamma A\to\rho}(t_{\min})}{dt} e^{-\alpha t}$$



$\sqrt{\alpha} \approx$ nuclear radius

Moles of nucleons/cm^2 per radiation length



Integrate Primakoff and ρ^0 cross sections over:

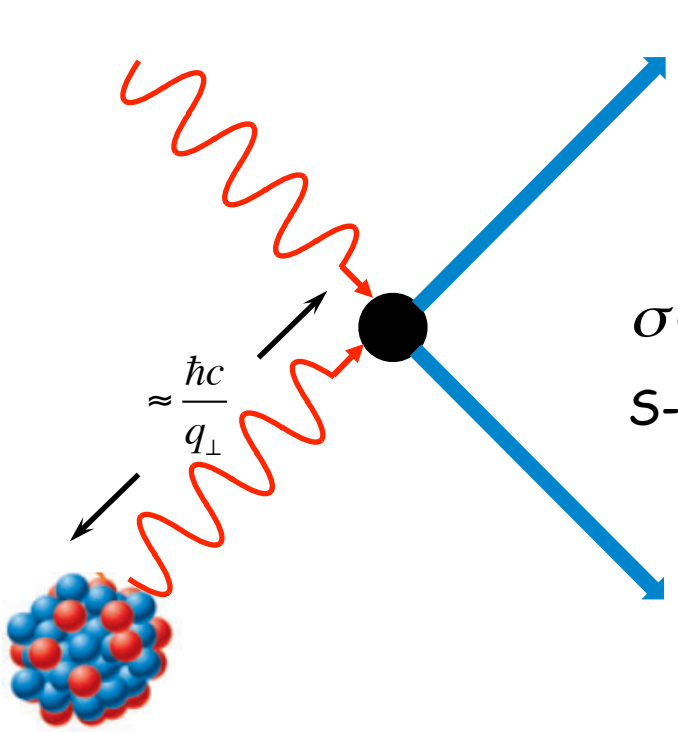
1. approximate range of angles accepted by the MWPCs
2. $\pi\pi$ invariant mass less than 500 MeV
3. momentum transfers less than

$$q_{\perp} < \frac{\hbar c}{R_{1/2\,density}}$$

to minimize final state absorption of the pions

The Jefferson Lab CPP Experiment

Primakoff production $\gamma A \rightarrow \pi^+\pi^- A$



want $\frac{\hbar c}{q_\perp} > R_{1/2\,density}$

$\approx \frac{\hbar c}{q_\perp}$

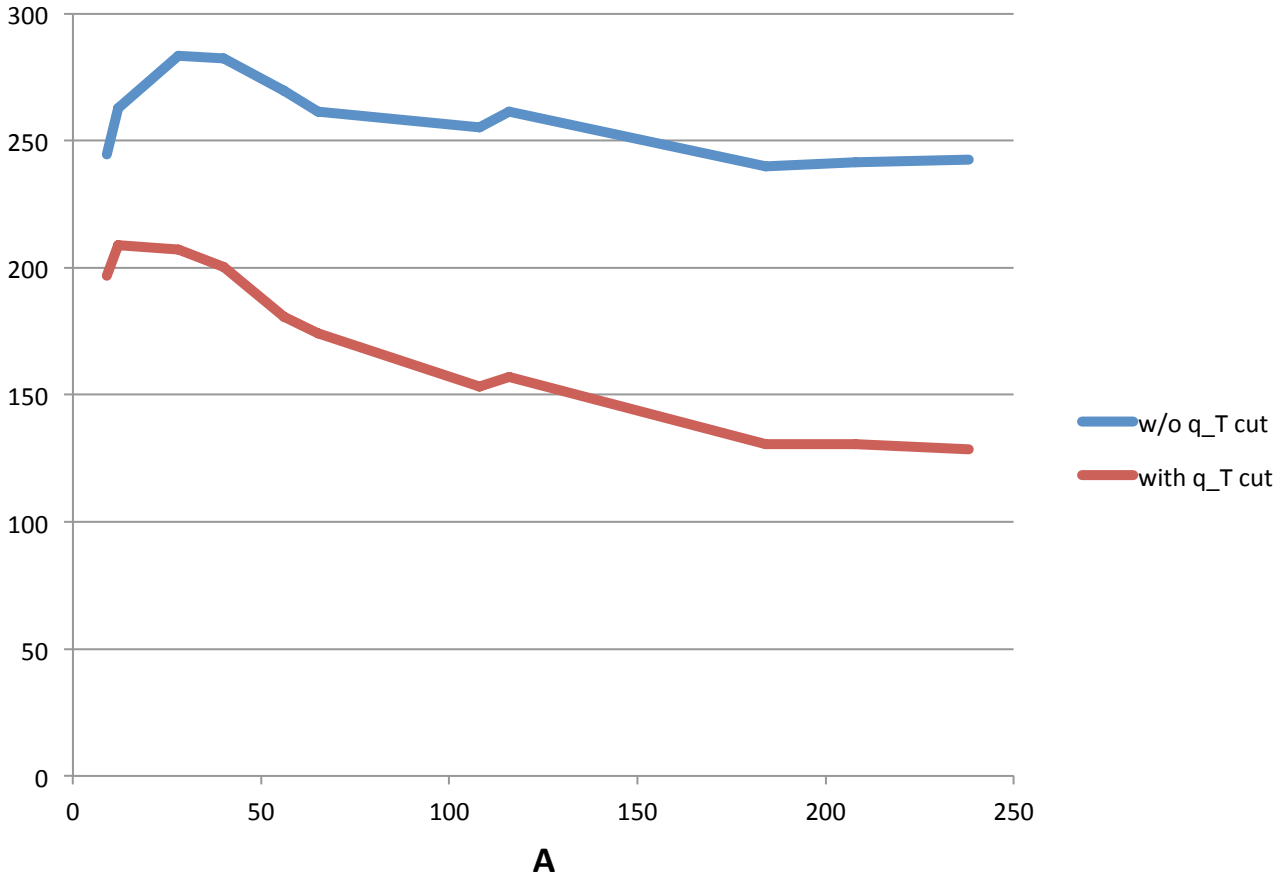
$\sigma(\gamma\gamma \rightarrow \pi^+\pi^-)$

S-wave is sensitive to α_π-β_π

$$\frac{d^2\sigma_{Primakoff}}{d\Omega dM} = \frac{2\alpha Z^2}{\pi^2}\frac{E_\gamma^4\beta^2}{M}\frac{\sin^2\theta}{Q^4}\left|F(Q^2)\right|^2\left(1+P_\gamma\cos 2\varphi_{\pi\pi}\right)\sigma(\gamma\gamma\rightarrow\pi\pi)$$

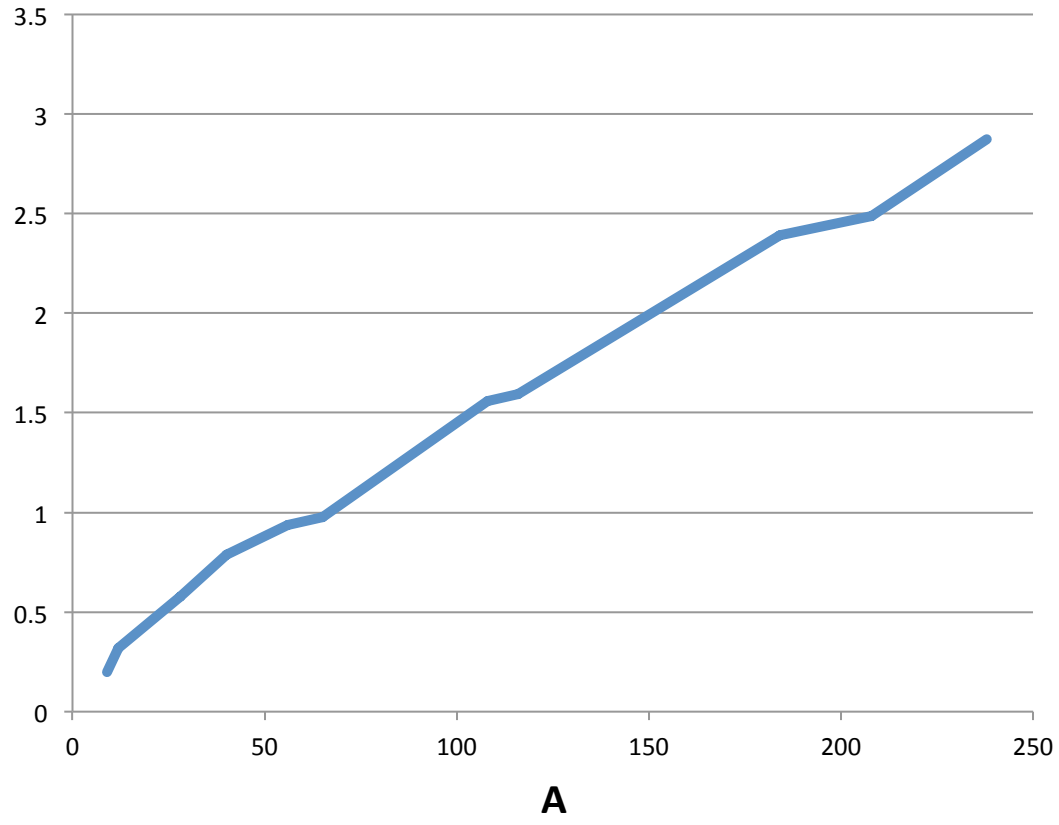
Primakoff rate per radiation length

$$\frac{atoms}{cm^2}\sigma_{\mathrm{Pr}imakoff}$$

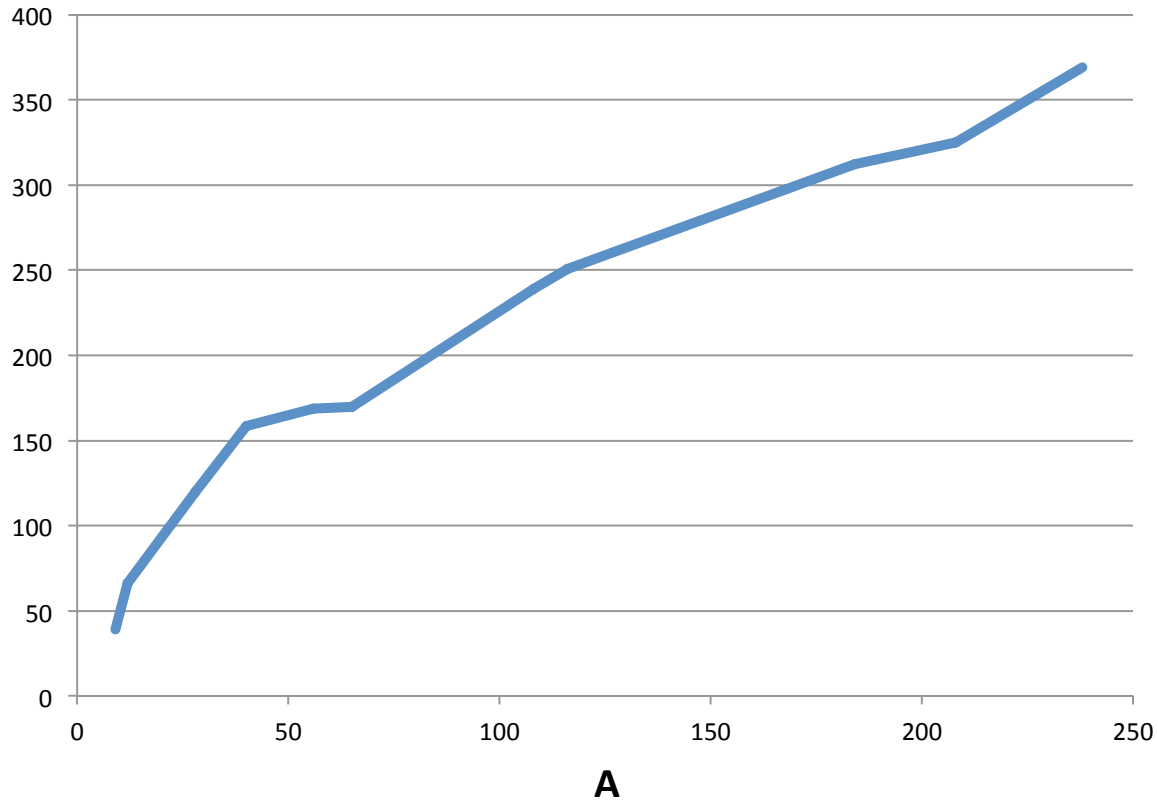


Ratio of Primakoff to ρ^0 cross sections with q_T cut

$$\frac{\sigma_{primakoff}}{\sigma_{\gamma A \to \rho}}$$



Overall “Figure Of Merit” = Primakoff rate/RL $\times \frac{\sigma_{primakoff}}{\sigma_{\gamma A \to \rho}}$



Conclusions: by this measure ^{238}U is a slightly better target than ^{208}Pb, but not by much. ^{208}PB is significantly better than ^{120}Sn.