

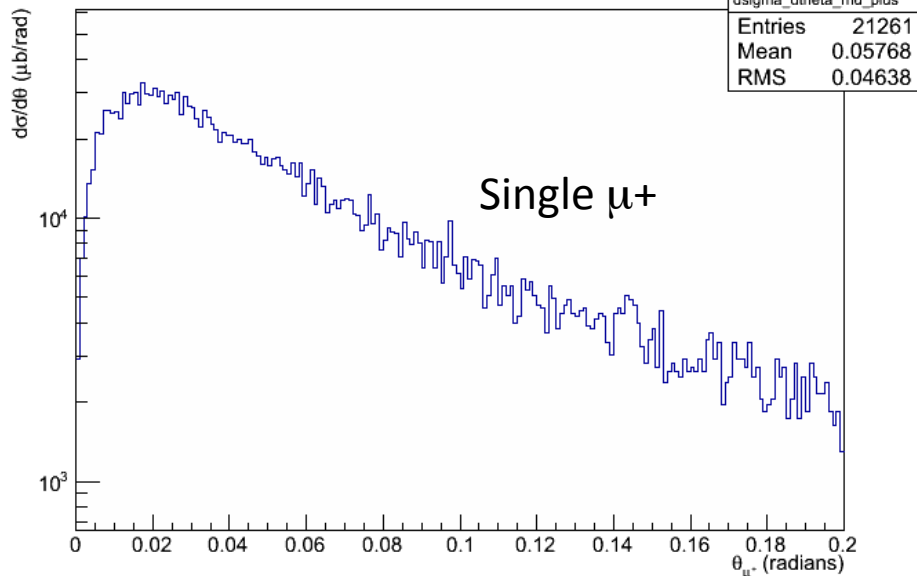
# $\mu^+\mu^-$ simulation

David Lawrence JLab

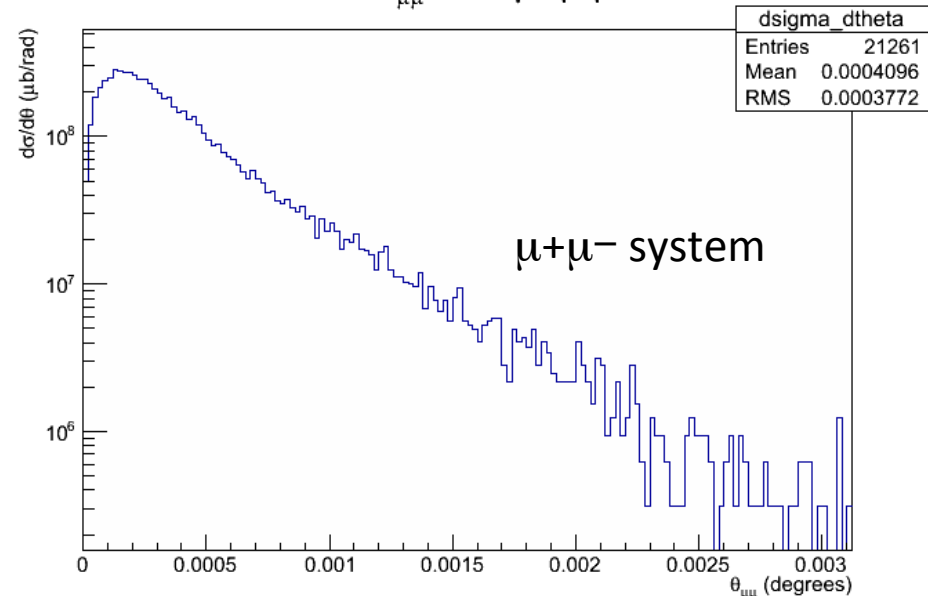
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- *hdgeant* modified to record particles produced via PAIR production
- Fraction of  $\mu^+\mu^-$  pairs is  $(m_e/m_\mu)^2$  that of  $e^+e^-$  pairs by default
- Fraction increased by factor of 10k for this study (i.e.  $\sim 20\%$  of pairs are  $\mu^+\mu^-$ )

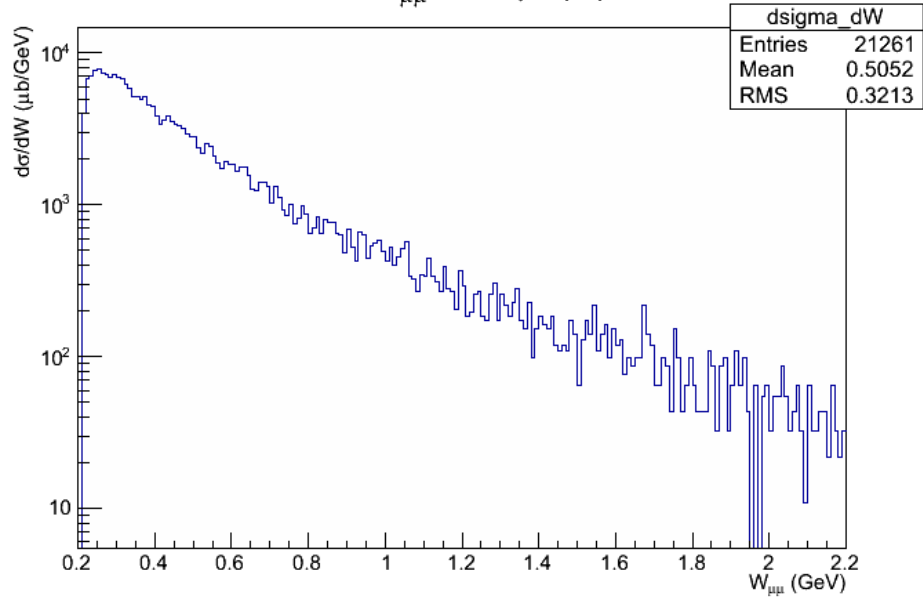
$d\sigma/d\theta_{\mu^+}$  from  $\gamma \rightarrow \mu^+\mu^-$



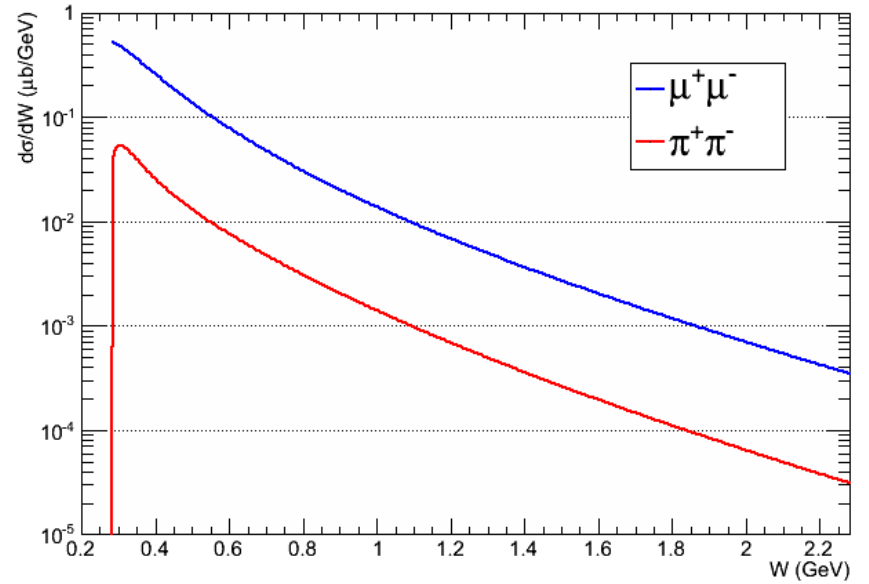
$d\sigma/d\theta_{\mu\mu}$  from  $\gamma \rightarrow \mu^+\mu^-$



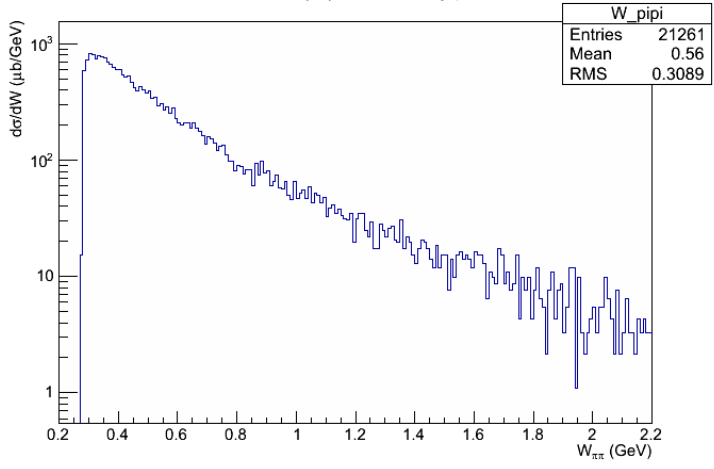
$d\sigma/dW_{\mu\mu}$  from  $\gamma \rightarrow \mu^+\mu^-$

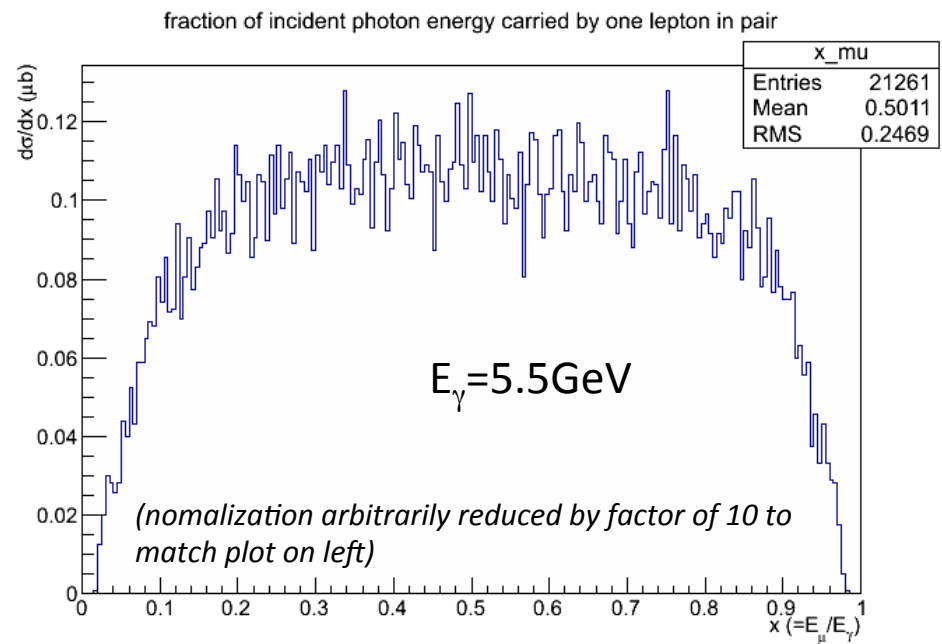
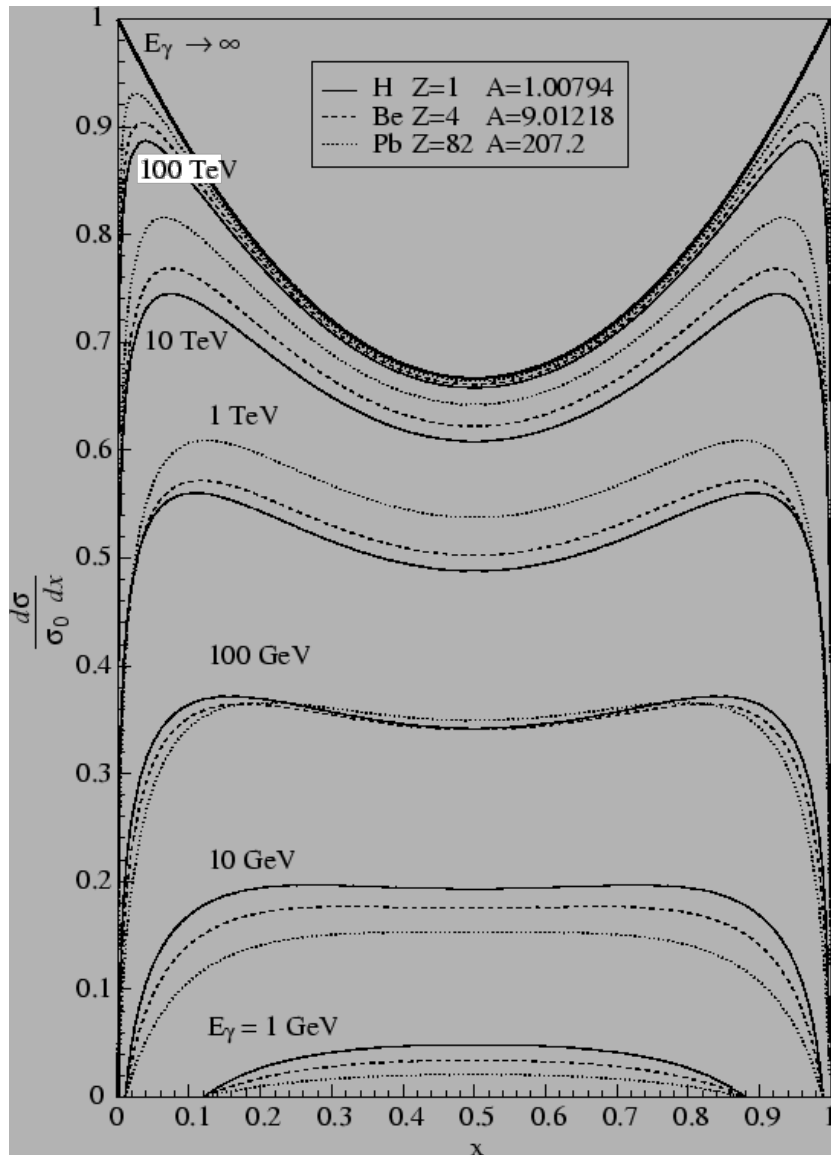


Cross-section vs. W



Invariant mass of  $\mu^+\mu^-$  assuming pion masses





**Figure 6.1:** Normalized differential cross section for pair production as a function of  $x$ , the energy fraction of the photon energy carried by one of the leptons in the pair. The function is shown for three different elements, hydrogen, beryllium and lead, and for a wide range of photon energies.