

Coherent Dilepton Pair Production in Heavy-Ion Collisions At RHIC and SPS Energies

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Outline

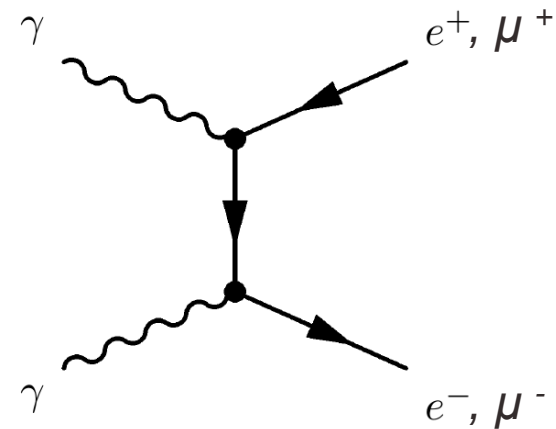
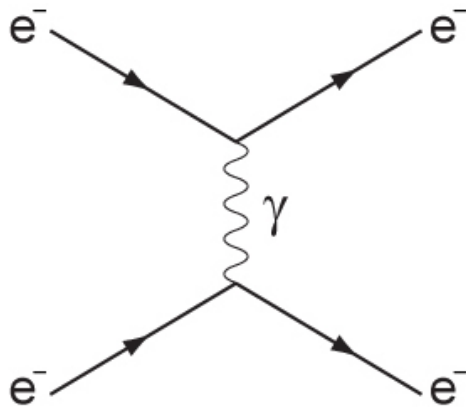
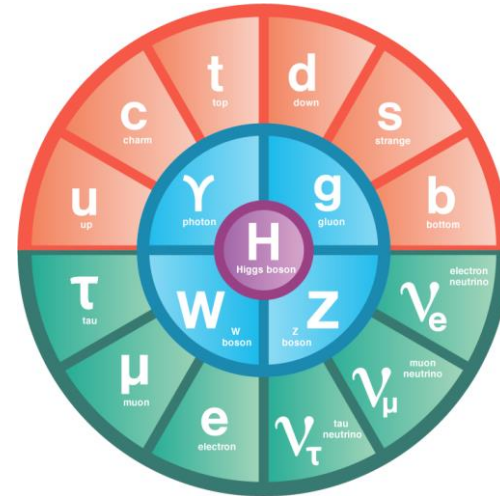
- Standard Model
- Photon Interactions
- Heavy Ion Collisions
- Coherent Pair Production Model Analysis
- Future Work



Background

Standard Model

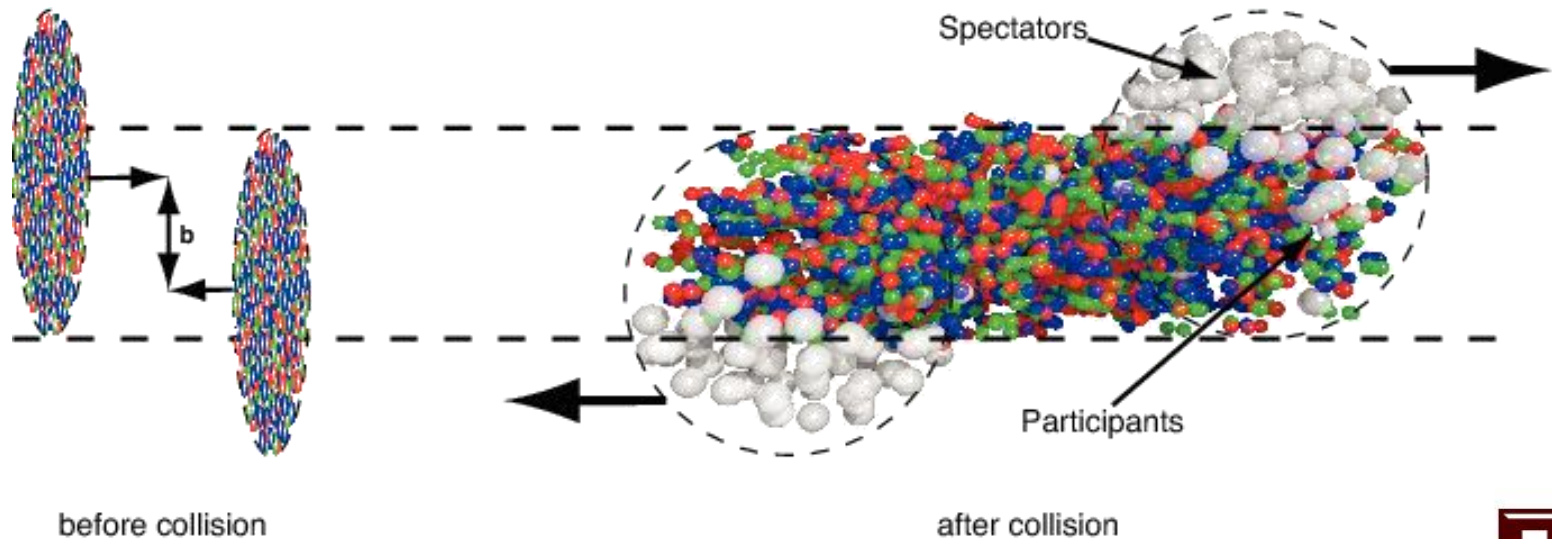
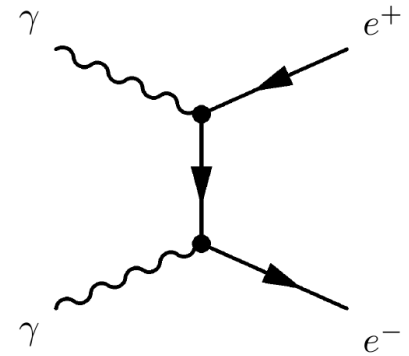
- Gauge Bosons as Force Carriers
- Photon-Photon Interactions



Heavy-Ion Collisions

Lepton Pair Sources:

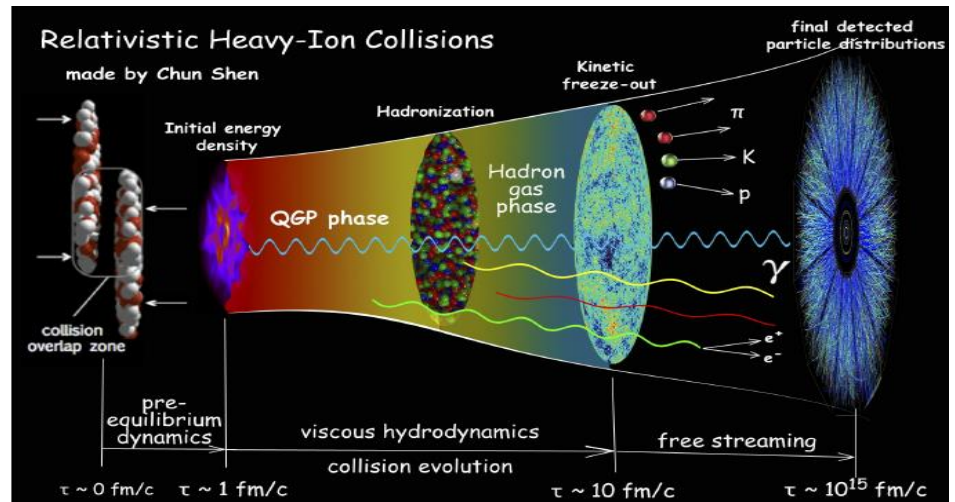
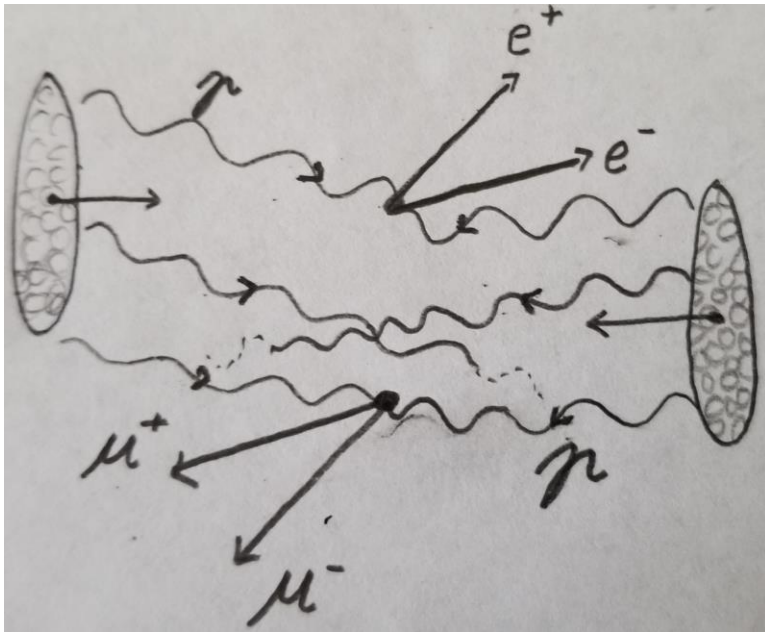
- Photon-Photon Interactions
- Thermal Radiation
 - Quark-Gluon Plasma
 - Hadronic Matter



Heavy-Ion Collisions

Experimental Phenomena

- Multiple Collisions
- Pair Production Overlap
- Using Dileptons to study the QGP

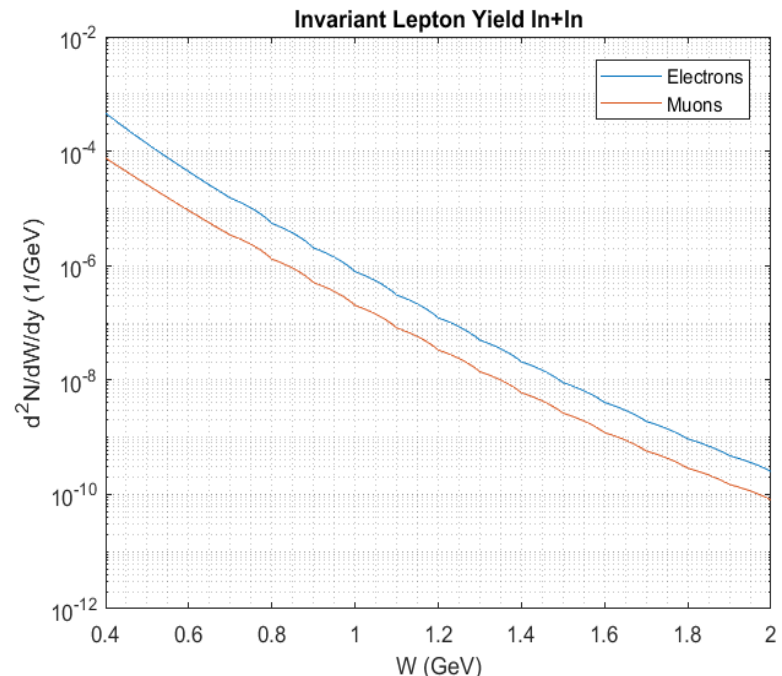
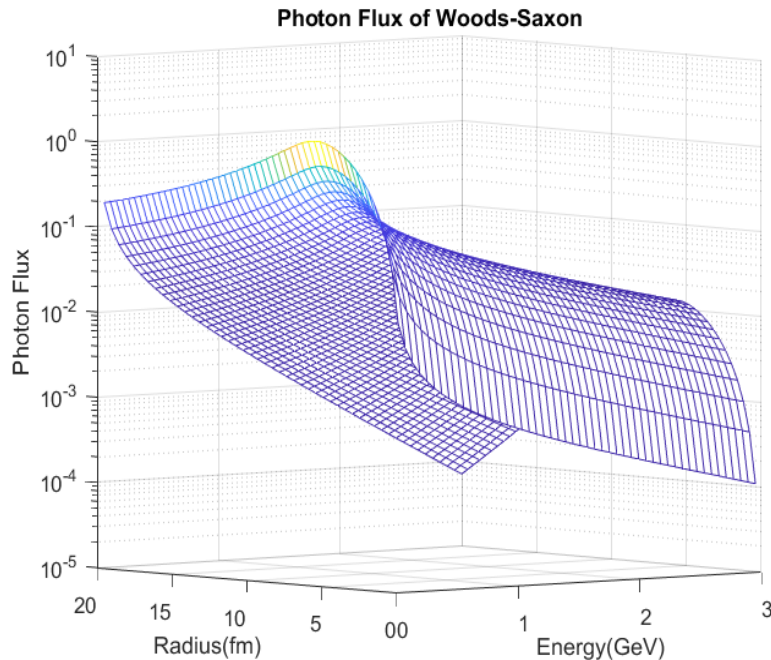


Photon Interaction Model

- Photon Flux
- Invariant Lepton Yield

$$n(k, r) = \frac{4Z^2\alpha}{k} \left| \int \frac{d^2q_\perp}{(2\pi)^2} q_\perp \frac{F(q)}{q^2} e^{iq_\perp \cdot r} \right|^2$$

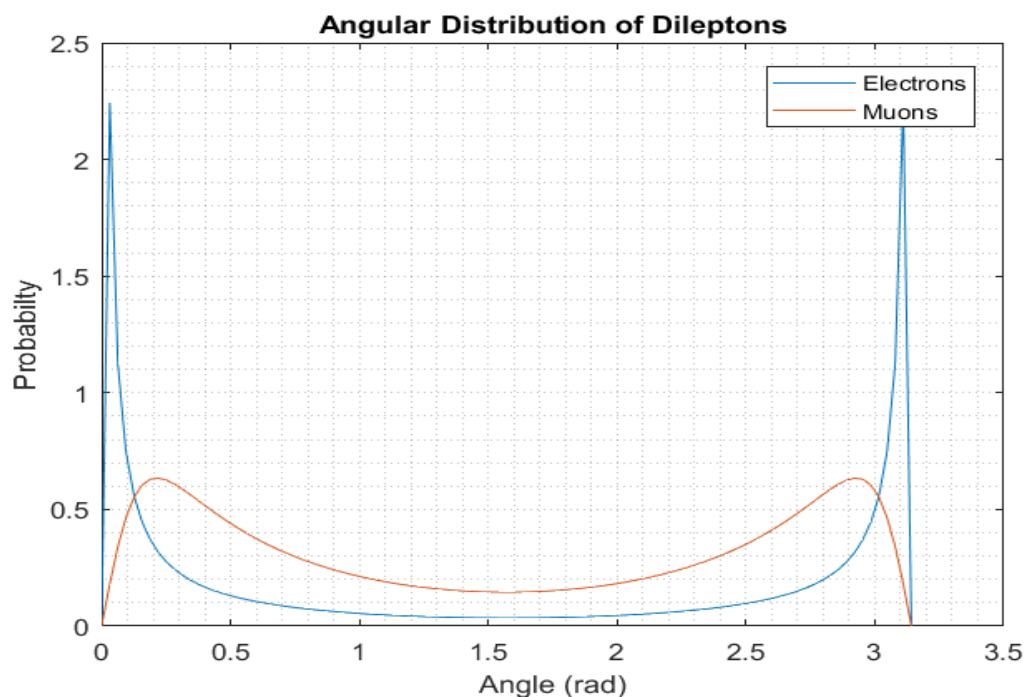
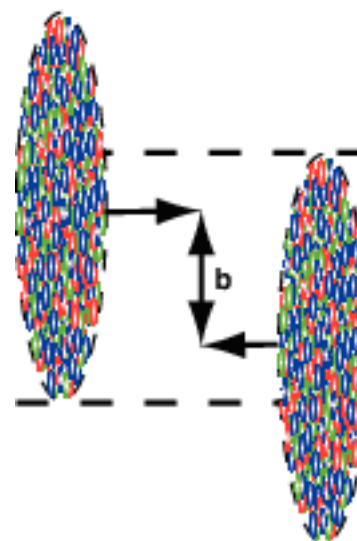
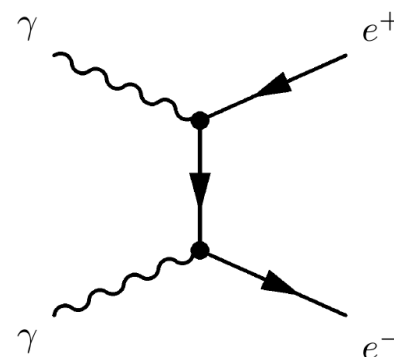
$$\frac{d^2N}{dW dy} = \frac{\int_{b_{min}}^{b_{max}} d^2b P(W, y, b) \times P_H(\vec{b})}{\int_{b_{min}}^{b_{max}} d^2b P_H(\vec{b})}$$



Detector Acceptance

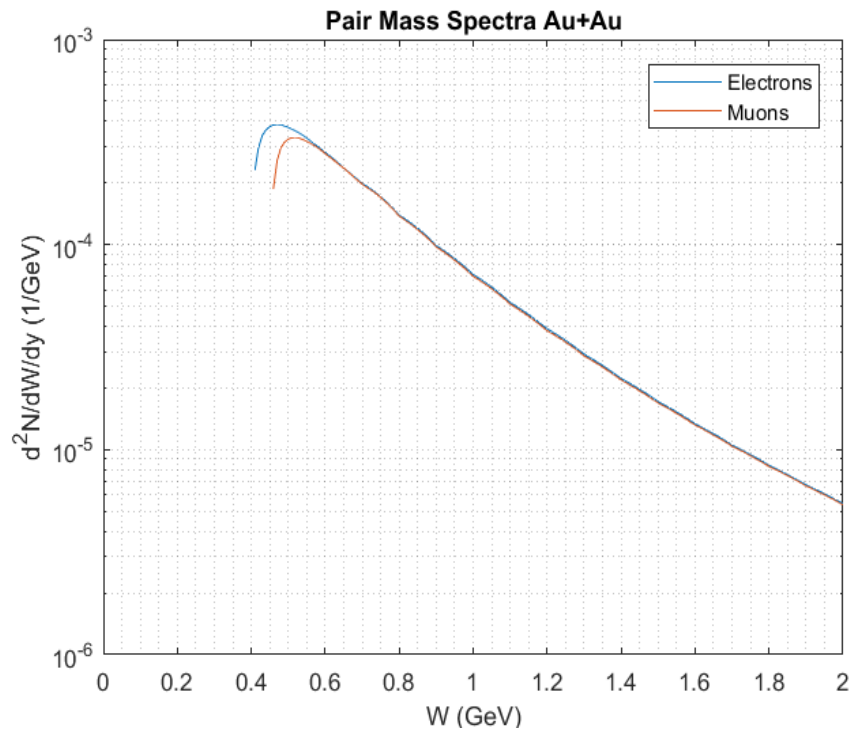
Experimental Cuts

- Angular Distribution
- Centrality Class

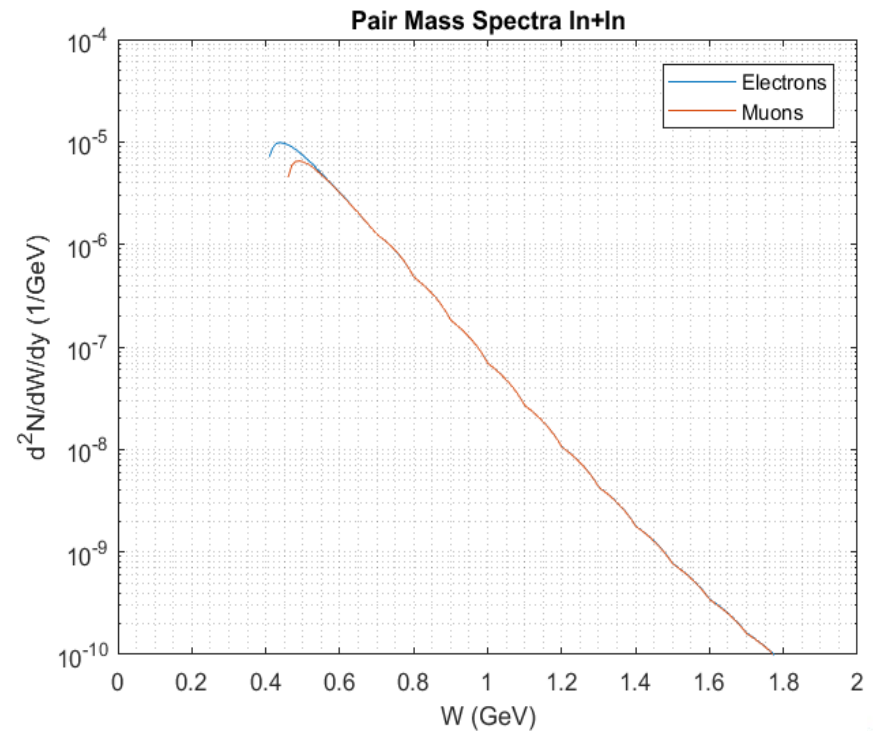


Model Analysis

Au+Au at 200 GeV / nucleon



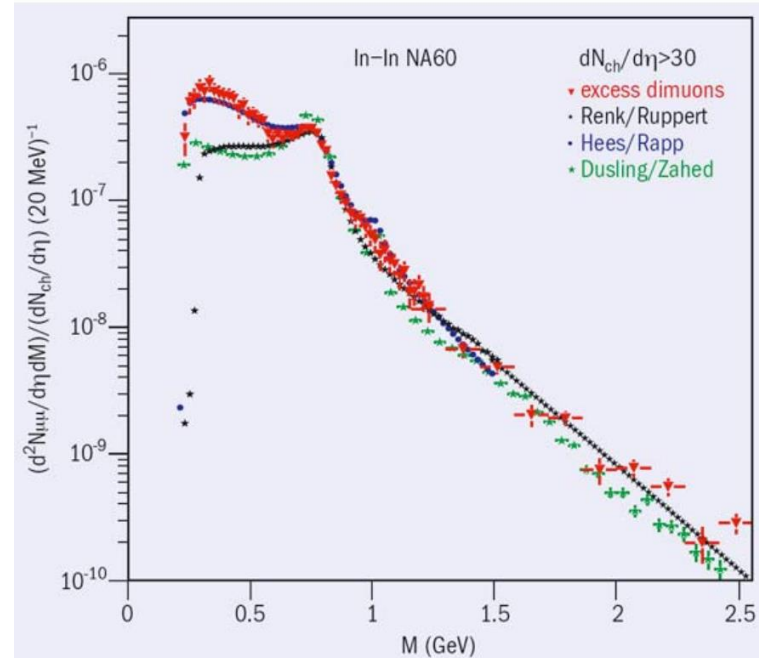
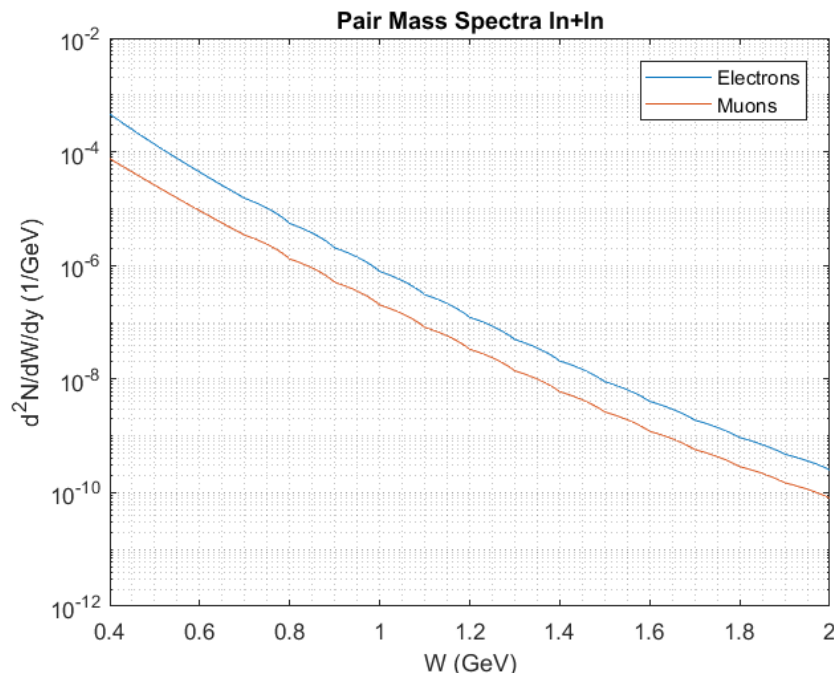
In+In at 17.3 GeV / nucleon



Future Work

Experimental Comparisons of NA60 Data

- Indium Yield
- Thermal Radiation (QGP + Hadronic)



References

- [1] STAR Collaboration, Int.J.Mod.Phys.Conf.Ser. 46 (2018) 1860013
- [2] W. Zha et al., Phys. Lett. B 781 (2018) 182.
- [3] R. Rapp, Adv. High Energy Phys. 2013 (2013) 148253.
- [4] H.J. Specht et al. [NA60 Collaboration] AIP Conf. Proc. 1322 (2010) 1.



Acknowledgements

- *This work was supported by the NSF under grant no. PHY-1614484 and PHY-1659847.*
- *Special Thanks to Dr. Youngs for leading the REU program for the Cyclotron.*

