

Spinfest 2016

Student Introduction

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Background

- Born in Yerevan, Armenia
- Family moved to United States when I was two months old and we have been in California ever since.
- Always interested in the microscopic aspect about things like cells, atoms, etc.
- Got into physics when I found out there was a whole other world inside atoms and we can actually probe it.
- Goal is to better understand the quantum nature of things (like spin) and find out what's up with gravity

Other Interests

- Movies
- Video Games
- Programming and computers in general

Education

- University of California Irvine (2008-2013)
 - B.S. Physics
 - Senior Thesis Project with Tim M.P. Tait
 - “Sensitivity of a future high energy $e^+ e^-$ collider to Z' bosons” J. Phys. G: Nucl. Part. Phys. 41 (2014) 075011. (Arxiv: 1312.3377)
 - B.S. Chemistry
- University of California Riverside
 - Started Graduate School in Fall 2014
 - Advisor: Kenneth Barish
 - Began working on Phenix Summer 2014

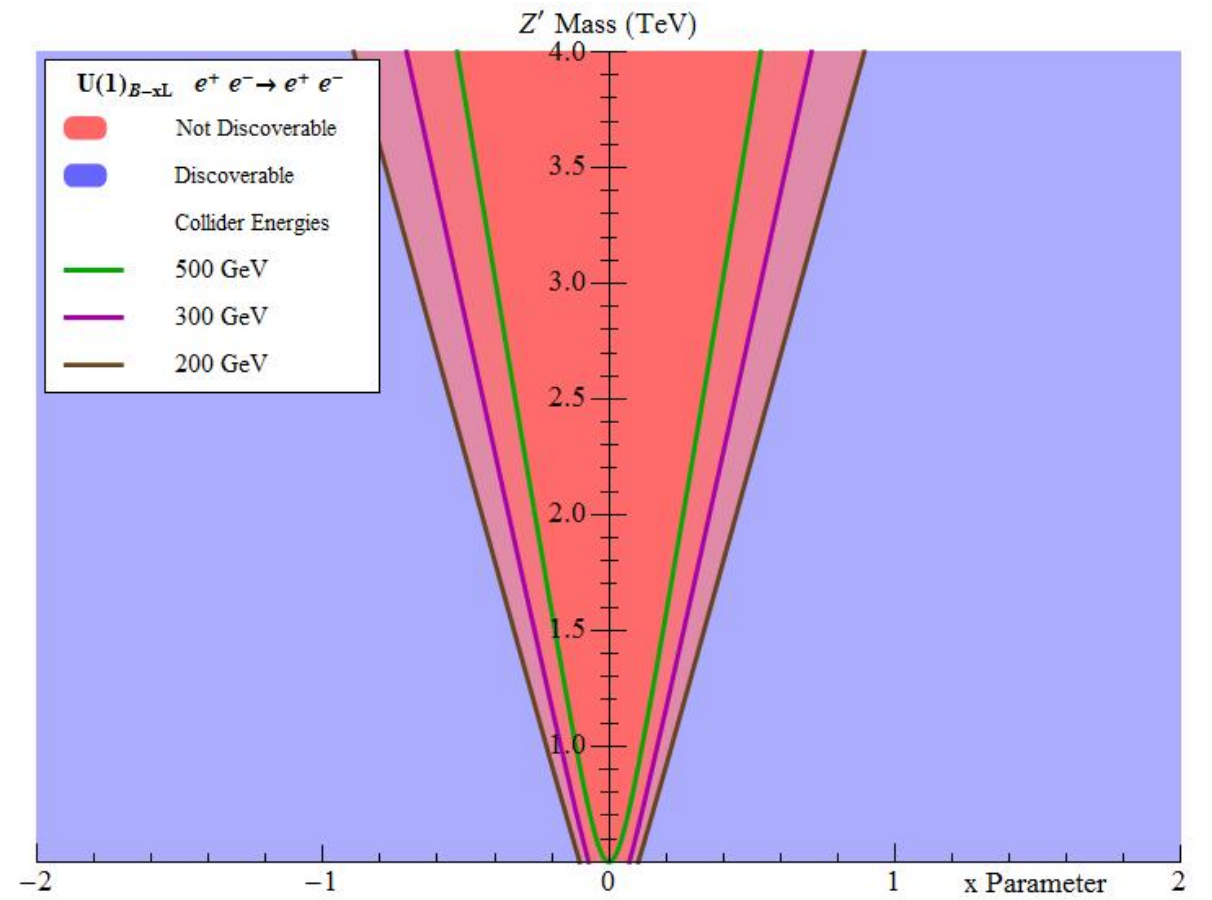
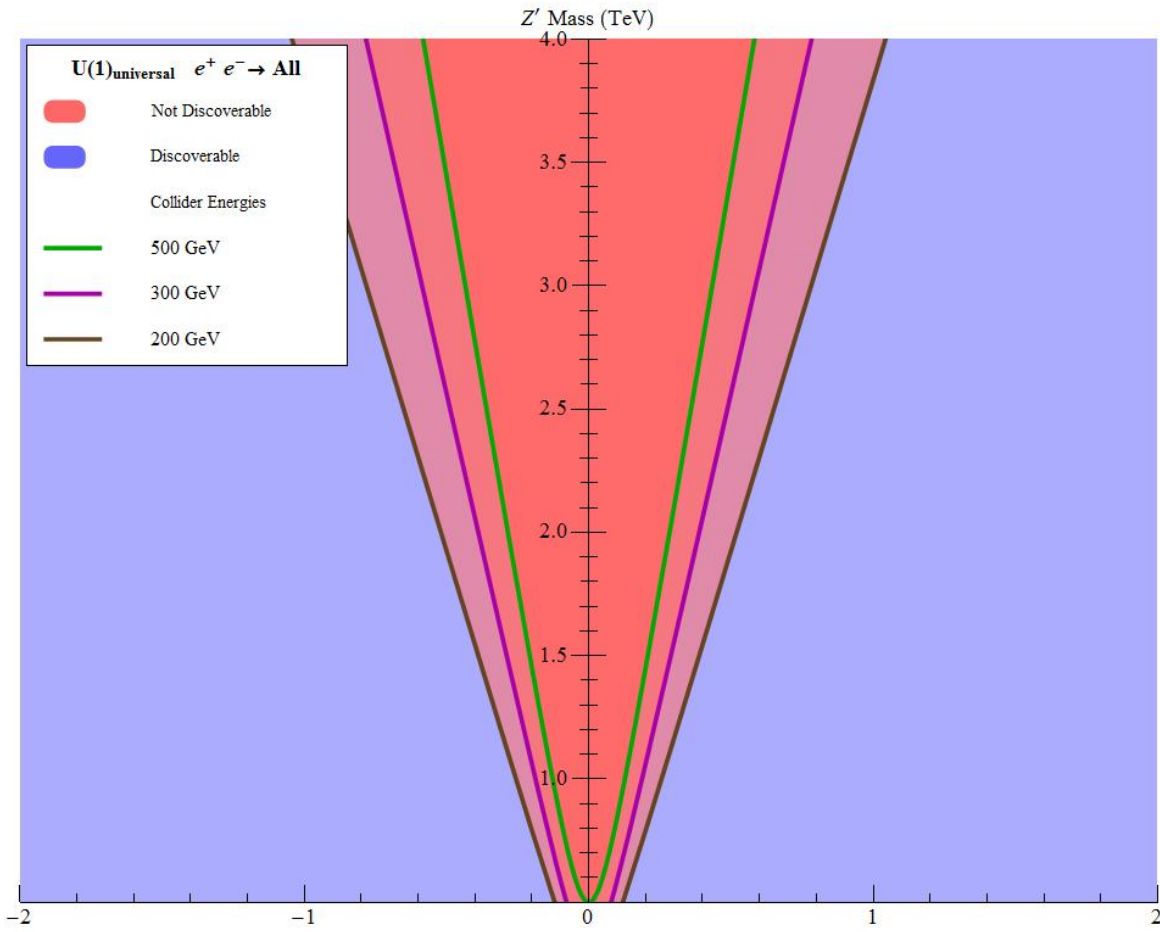
Undergrad Senior Thesis

- Explored the limits of discovering a Z' boson
- Z' boson treated as an extension to the Standard Model, specifically $U(1)'$ gauge group
- Similar to Weak Interaction via Z boson but much heavier (>2.5 TeV)
- Ran simulations with a virtual Z' interaction in an $e^+ e^-$ collision at various energies and 100 fb^{-1} luminosity using MadGraph
- Four different models were considered and each coupled to e^- differently
- Cross sections of $e^+ e^-$, $\mu^+ \mu^-$, jets, and bottom quarks were fitted to second order in coupling and mass based on the model considered

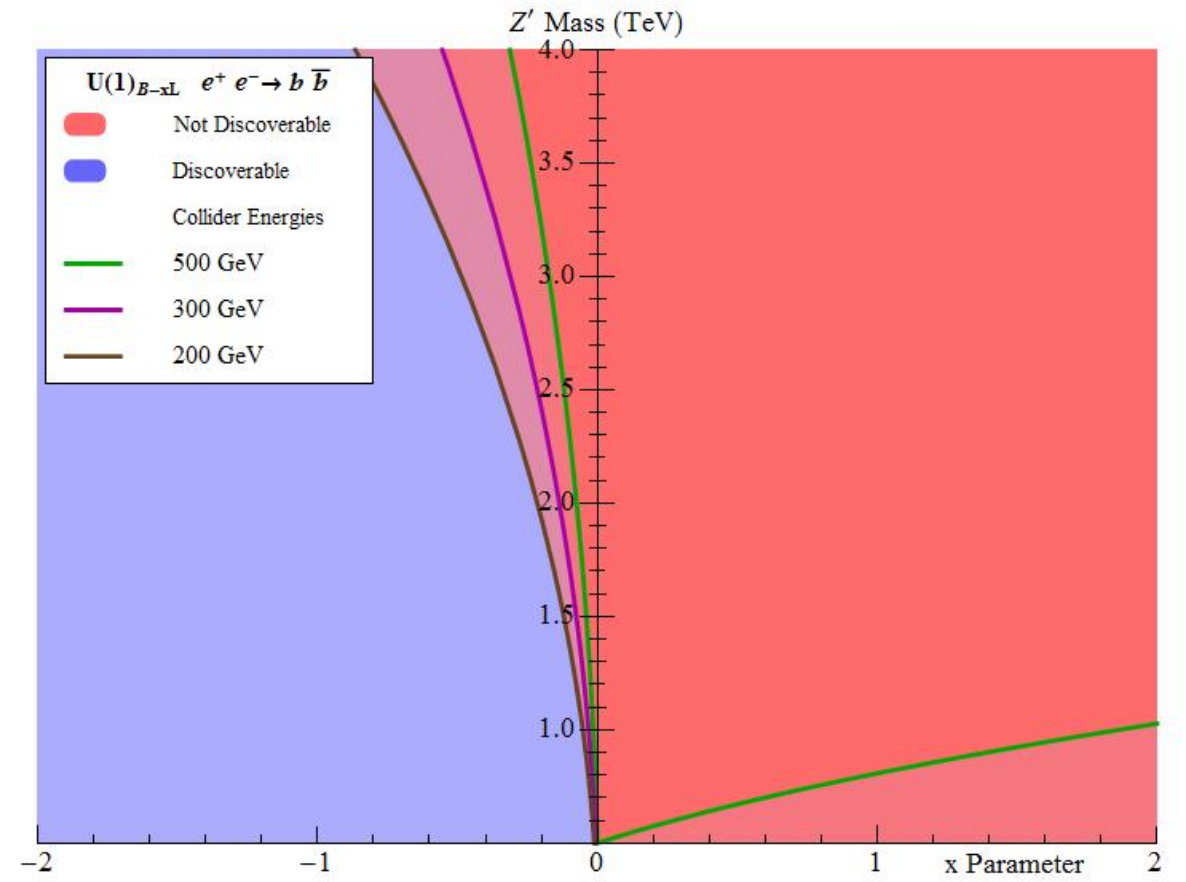
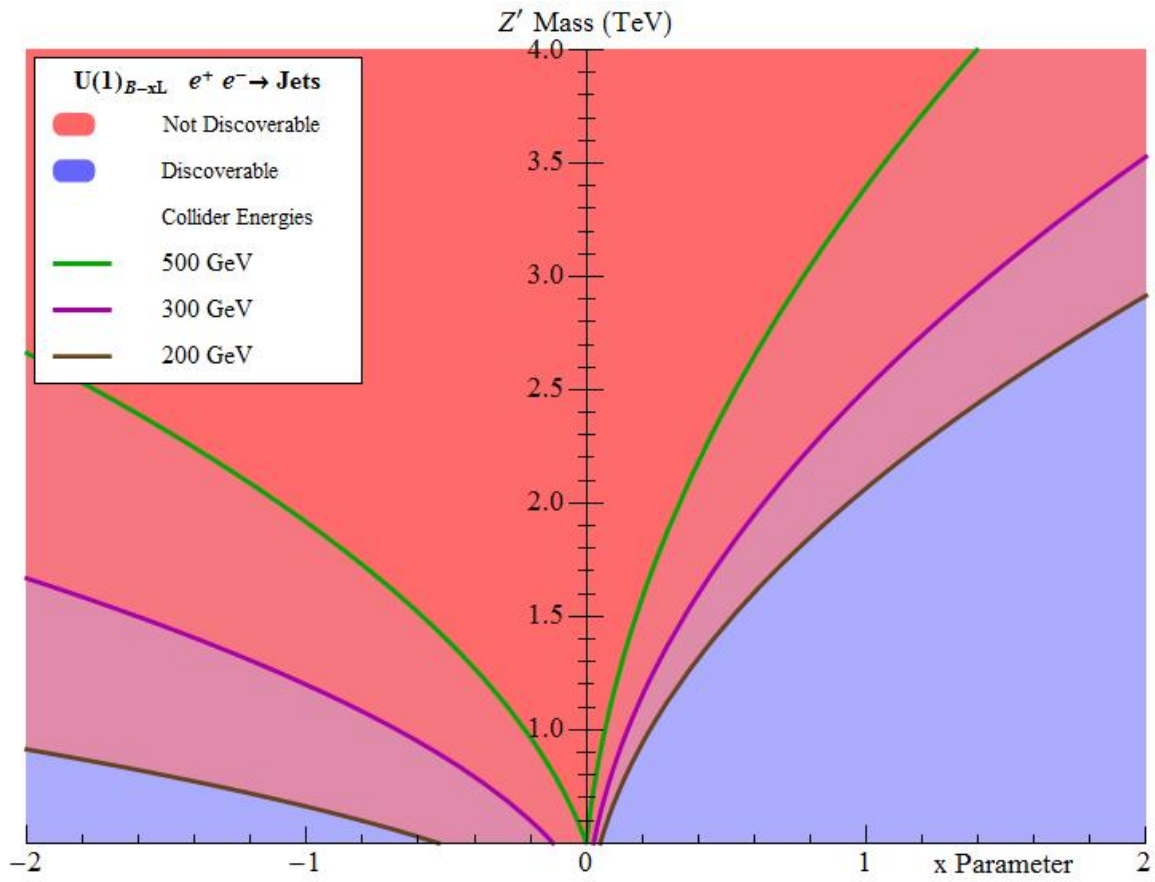
Models Considered

Z' Model	$U(1)_{\text{universal}}$	$U(1)_{B-xL}$	$U(1)_{10 + x\bar{5}}$	$U(1)_{10-xu}$
g_{qL}	x	1/3	1/3	0
g_{uR}	x	1/3	-1/3	-x/3
g_{dR}	x	1/3	-x/3	1/3
g_{lL}	x	x	x/3	(-1+x)/3
g_{lR}	x	x	-1/3	x/3

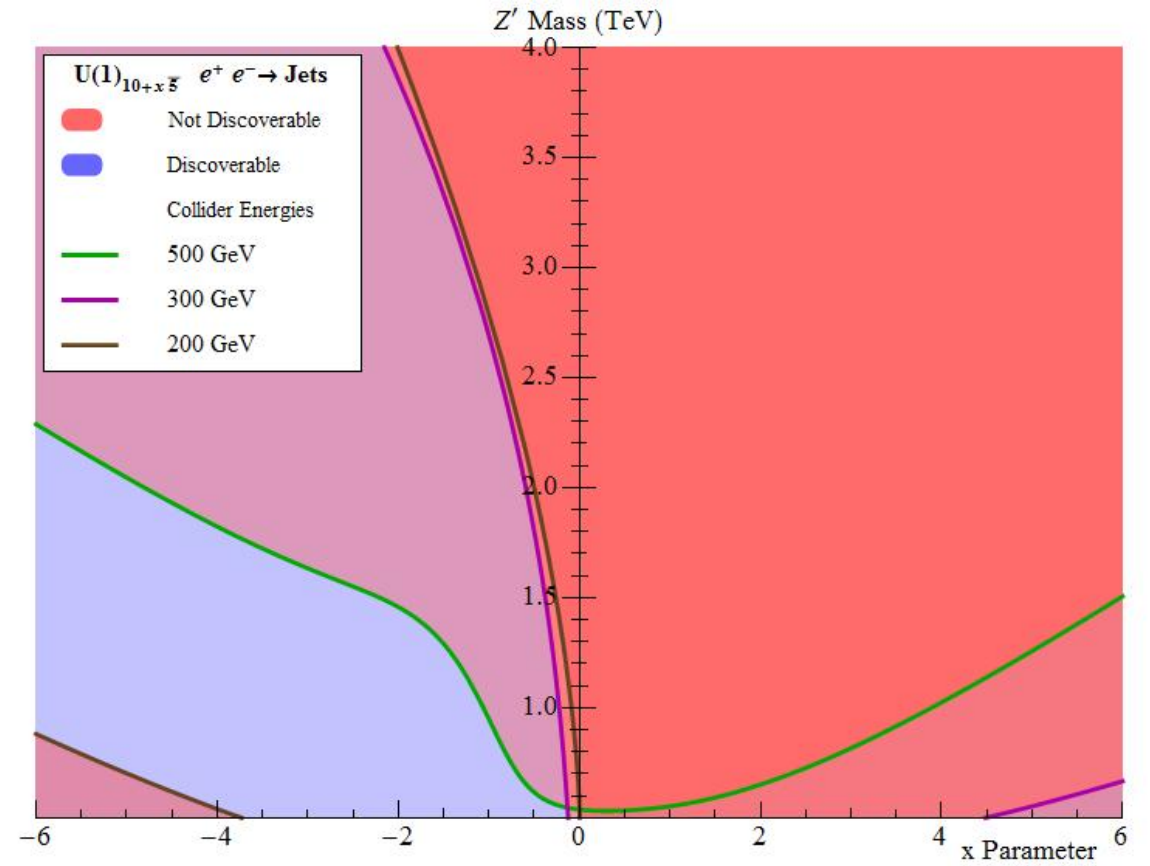
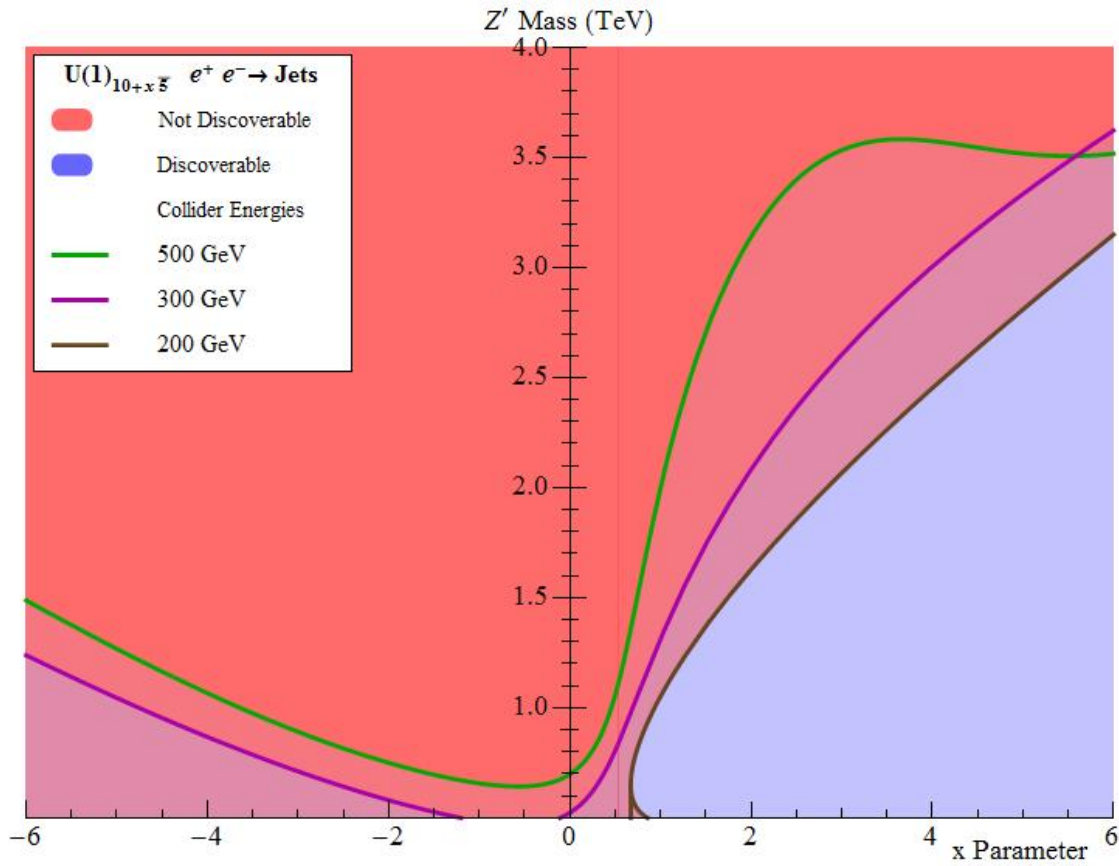
Results



More Results



Even More Results

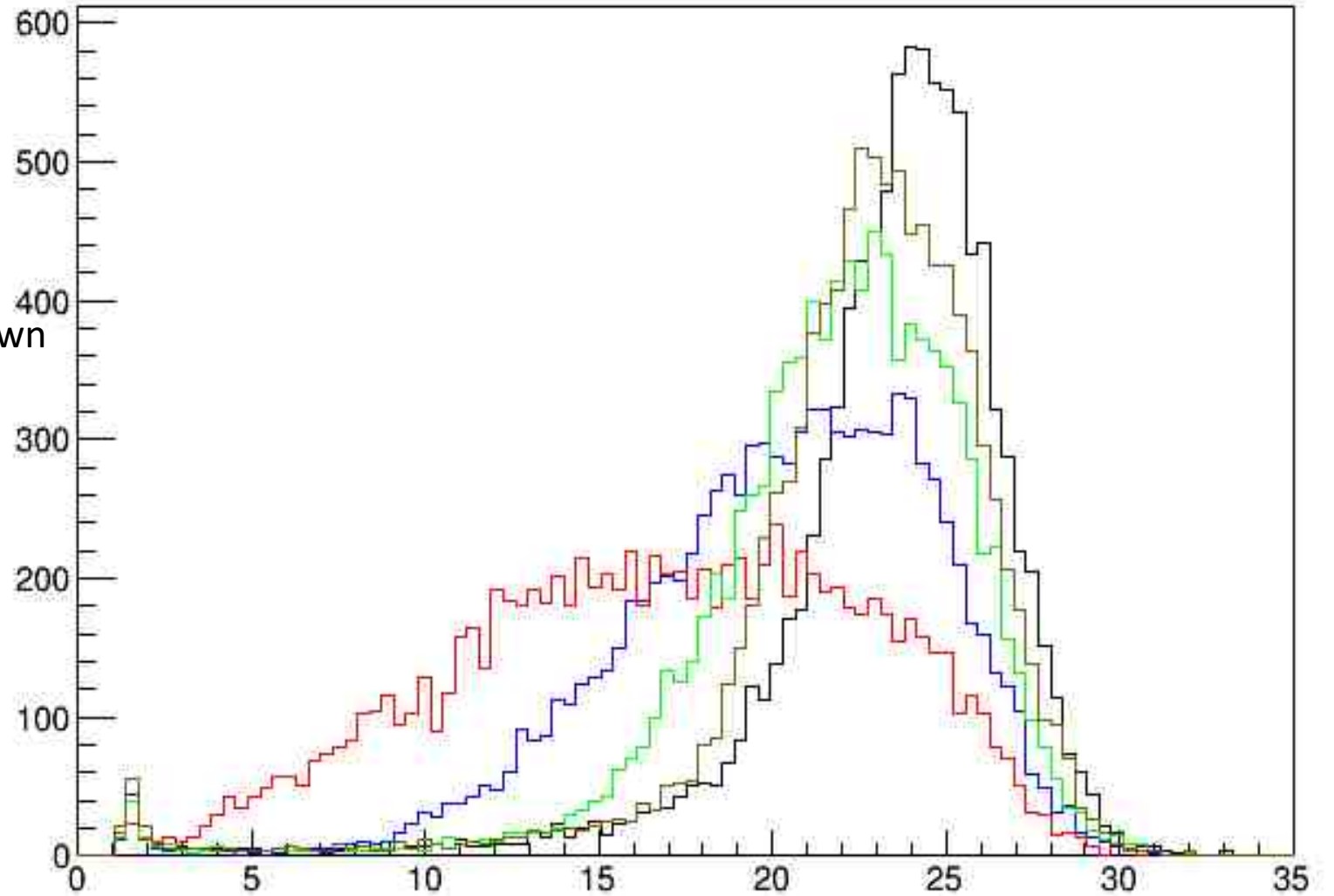


Current and Future Work

- Finished with Courses and passed Comprehensive Exam
- PHENIX and sPHENIX/fsPHENIX collaboration at BNL
- Previously worked on Analysis of data from Run 15
 - Emphasis on MPC-EX and MPC to probe proton spin structure by looking at direct photons from pp (maybe p Au and p Al) collisions.
 - Data was no good because of timing on svtx chips
 - The goal was to measure the contribution of the Sivers Effect
 - Will start work with STAR in the coming year to measure this effect
- Also working on fsPHENIX simulations
 - Looked at plug door dimensions to see how it affected the energy lost by the incoming particles
 - Now looking at energy resolution of forward calorimeter

How plug door thickness affects energy loss

- fsPHENIX uses an iron cylindrical block as a magnetic flux return
- Its thickness was altered and the resulting energy measured is shown in the Plot on the right
- Red is 20.4 cm (Double)
- Blue is 10.2 cm (Default)
- Green is 5.1 cm (Half)
- Orange is 2.55 cm (Quarter)
- Black is 0.1 cm (millimeter)



Energy resolution of forward detector fsPHENIX

- Just started this study by looking at mean (\bar{E}) and RMS (ΔE) values from histograms like the one before.
- Plotted $\Delta E/\bar{E}$ to see how detector is working
- Plot can be seen on the left
- Work in progress

