Neutrino Physics - VALOR JROTC INTERNSHIP

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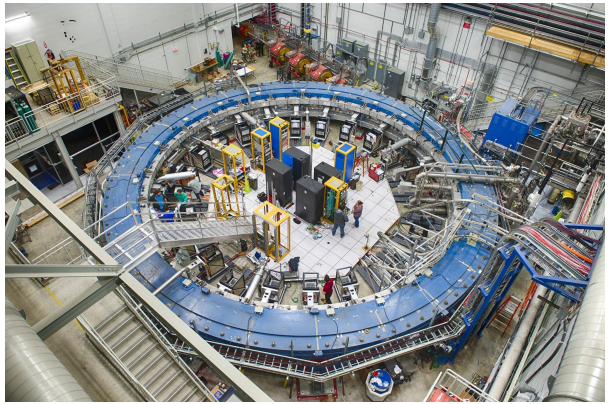
INTRO

- Rising Senior, Deputy Commander, and Emcee of the Air Force Academy High School
  - Supervise officers throughout Cadet Staff and in-charge of special guest ceremony procedures.
    - Hobbies of mine are to travel the world, network, and play volleyball
      - Been to multiple countries, predominantly central america.
        - Plan to major in Business Management/Economics, preferably at Arizona State or Wharton School of Business at the University of Pennsylvania.

Arizona State University

Wharton University of Pennsylvania

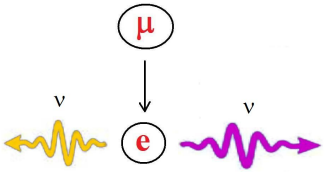
Why Fermilab?



- Fermilab is one of the major international laboratories throughout the world!
  - Internships here at Fermilab alone are highly competitive and to be accepted and be apart of ground-breaking work is a once-in-a-lifetime opportunity.
    - Major Experiments are ongoing!
      - Muon G-2 is a internationally recognized experiment here at fermilab that involves the examination of Muon Stability. or the DUNE Project that is undergoing construction.
        - Also gave me something to do during the 2-3 months of freetime on my hands

What are Muons?

- Muons are a type of particle in our everyday lives! they are around us!
  - They are considered a Large electron that is classified as a lepton.
    - Cosmic Ray Showers are showers of high energy astrophysical particles that come specifically from the sun throughout the universe that collide into our atmosphere that decay to muons.
    - they also divide in Pions and other known elements. but we study muons due to their long-term lifespan on the ground

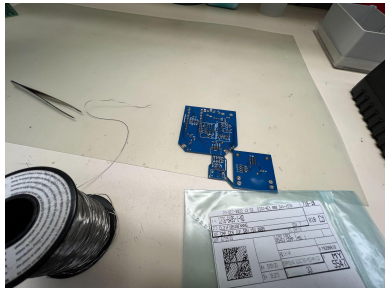


- Muon Foundation and Weather Correlation
  - In my Neutrino Division, which is Particle Physics, we are currently analyzing data throughout the world about Muon entrance into atmosphere.
    - Current data suggests a rate of 1 muon every second for an area of 1 square centimeter on the surface of the Earth.
      - so my assignment with another intern was to base this information to create a mimicable chamber such as the neutrino observatory chamber called super-kamiokande in Japan!

Task: ROOT CERN EXAMINATION

- throughout these 5 weeks, I was tasked to use 2 various data showers using ROOT CERN
  - ROOT Cern is computer database used to analyze bulk data files converted to branches that match a trees structure and makes data plots for analyzaion, papers, etc.
    - throughout this internship, I worked on 2 seperate data showers that were converted to data plots
    - there are no visual plots on this presentation due to our technological outage occurred last friday, causing different 2 computer system switches in the process this week alone

Task: Muon Detector (Cosmic Watch)



Special Thank you to Cosmic Watch for making this possible!

Cosmic watch developed a type of detector that is used to for muon evaluation. its used to mimic a bubble chamber such as those

1. Building the boards (assembling it was fun, saundering was fun but tedious at times.)
2. Assembling the circuit with together to create the machine (Little machine about the size of two golf balls)
3. This detector will continue to help analyze further data similar to Super- to use within ROOT Cern

Fermilab

Favorite Workshops

1. Favorite Workshop was the College Admission workshop. one specific tip that stood out to me was reaching out to counselor on recommendation letter during the summer.
2. Another Workshop that stood out was the Resume workshop was useful in terms of standing out in the workforce. found surprising that most recruiters take on average 6 seconds per resume.

Fermilab

Favorite Tour

- Favorite tour was the Environmental Tour of the protected grasslands here at Fermilab!
- Fermilab has over nearly 7000 acres of property!
- State-of-the-art environment protection measures!

Reflection

1. Gained more knowledge on Physics and Neutrinos

2. have a deeper understanding in STEM-related Careers

3. learned more about coding practices

4. proud to have done a small part in the overall research in my department

Acknowledgements

Entire Department of EDIA – for having great coordinators such as Cortez Watkins and Anahi Ruiz Beltran

Brian Ramson- Being a great supervisor and helping navigate through any concerns

Yusuf Aamir- acting as second-in-command and having in-depth conversations relating to physics

Family and Friends– for supporting my future endeavors

Lt Colonel Susumu Uchiyama– for not only being our commandant but also recommending Myself, Connor, and Destiny to this fantastic opportunity.

Alan Stone- for helping to fund the VALOR JROTC internship and other Veteran-related opportunities in Fermilab

DAY IN THE LIFE OF A FERMILAB INTERN (VIDEO)

https://youtu.be/GGnOFF64Xm4?si=3lu8i5DHV8nRer_Y


Thank
You