

Jetting through the primordial Universe!

A personal journey through the field
of high energy nuclear physics!

LHC Job Matching Event - LHC ECSF, 14th May 2024

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First things first!

Who am I?



- Prof. Raghav Kunawalkam Elayavalli
- Preferred pronouns - They/Them
- Assistant Professor of Physics @ Vanderbilt University located in Nashville, Tennessee
- Steering Committee member - Fisk-Vanderbilt Bridge Program
- Affiliate faculty Vanderbilt Data Science Institute
- RHIC AGS Users Executive Council member
- High Energy Nuclear Physicist

Identities!

I have a few...

Non-Binary and Transgender

- Present trans-femme - that means that if folks see me, they will assume that I'm a transgender women

South Indian and Asian

- I was born and brought up in Chennai, a huge metropolis in the southern Indian state of Tamil Nadu

- I'm also an **able** bodied, **tall** (6-3) **brown skinned person** with dark hair

- Why is this relevant?

We need to understand the context!
I socially and publicly transitioned right before I started my faculty job and there is a reason for that...

Path to where I am now!

18,427,219.13 m distance traversed!



Undergraduate



Masters



PhD



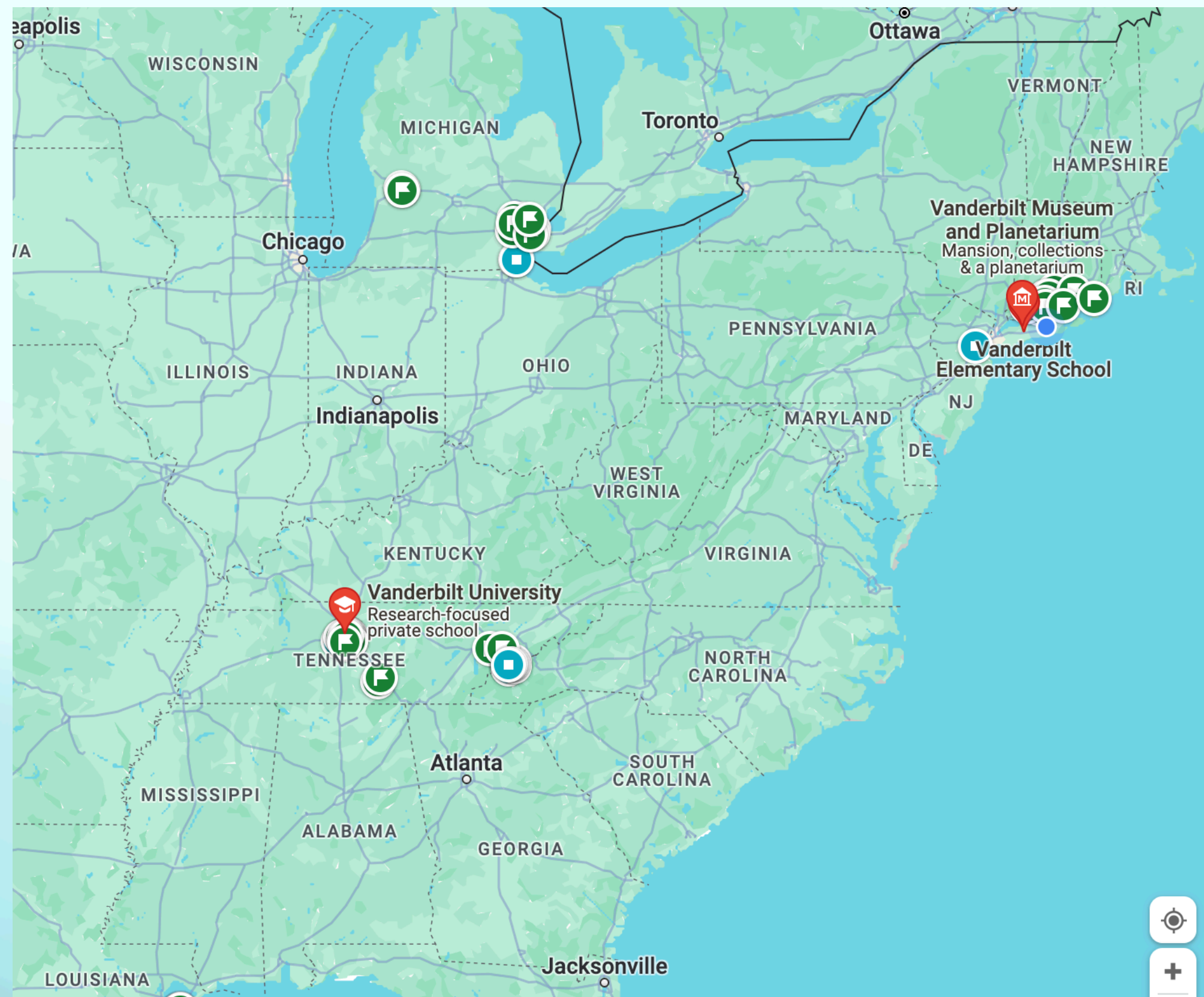
Post-doctoral
research fellow



Associate
Research
Scientist

Path to where I am now!

18,427,219.13 m distance traversed!



Vanderbilt University!

My pathway

One of many!

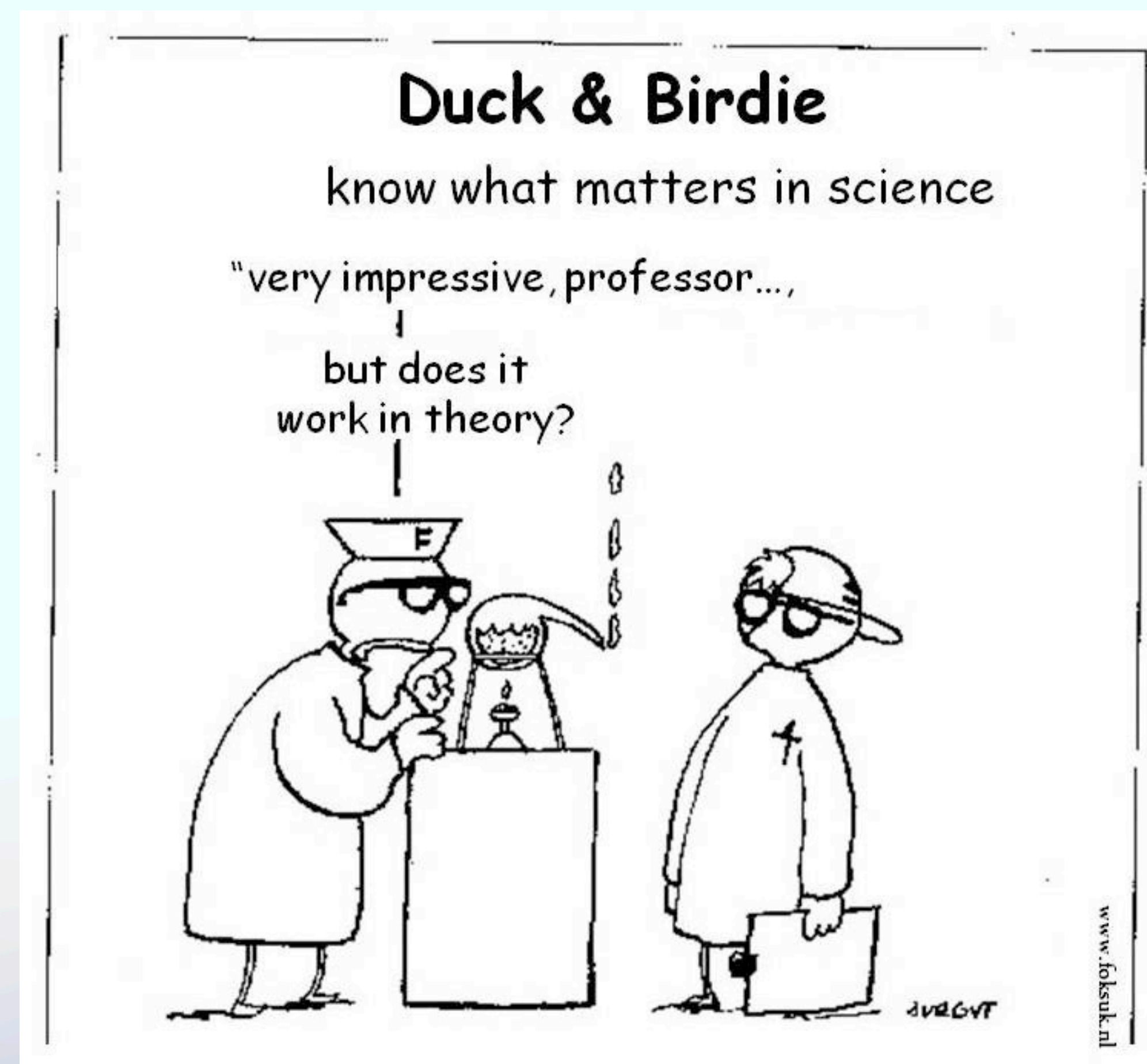
- Every person's path is unique in a sense since we are all unique
- There is NO ONE path to success
- That said, there are essentially similar paths for similar professions - research/teaching focused institutions, academia, industry, management etc...
- I know one path intimately, a few from my friends, but this has survivor bias written all over it!



Lets discuss a bit more of how I got here!

Experiment or theory?? Why not both...

- Undergrad summer research 1 - high energy experiment at CMS simulating signature of technicolor! Was helping graduate students and postdocs in their analysis preparation
- Undergrad summer research 2 - theory work on non-commutative geometry and thermal field theory
- Found out that at some level, I enjoy thinking about theory calculations, phenomenology but at the same time, I want to make measurements!



Undergrad to Masters

Stony Brook University, NY

- Went to stony brook to do my masters and wanted to do string theory!
- I internalized that the people around me were *much* smarter and that I wasn't cut out for this program
- Got curious about experimental spin physics program and found a group to work with!
- EIC physics - searches for leptoquark in tau-jets
- Wrote a computational framework called 'EICROOT' built on 'FAIRROOT' from GSI
- Wrote my own jet finder and then found out about fastjet...
- Decided that I would like to work on data that I can see in front of me and not on anything outside
- First significant moment where I choose a physics program that I found interesting!

Masters to PhD



Rutgers University, NJ

- Started at Rutgers with a fellowship to work on CMS
 - Still had to take classes and pass the qualifier within the first two years at Rutgers
 - Wrote a thesis and defended within 4 years with jet spectra measurements in p-p, p-Pb and Pb-Pb collisions
 - Spent a summer at CERN on a Marie Curie early career fellowship with the MC-Net program working with the theory group (back to theory!!!)
- Freedom to move to a specific research area and explore!
 - Worked on measurements with multiple collaborators and with significant impact on my future!
 - Decided to switch accelerators and head to RHIC!
 - Start to form opinions around what I found interesting and what I wanted to do more of

Grad to PostDoc

Wayne State University

- I was not sure if I wanted a lab postdoc or an university postdoc... both have pros and cons
 - I applied to a couple of lab positions with named fellowships with the idea that it will help me with my career... thought of continuing with the same experiment
 - I got one of the fancy lab positions but it was in a different field of nuclear physics and had to spend time reinventing myself, plus my partner didnt enjoy the idea of moving to that city
 - Met my postdoc advisor during a conference where he was chair of my session
- See if you can spend some extended time during your PhD at a lab (like CERN) and if you like that sorta life style
 - Network! Network! Network!
 - Highly recommend switching experiments or labs or something that is slightly different than what you did for your thesis!

What I look for in a 1st postdoc

Transition to an independent scientist!

- PhD is essentially a learning period to be an independent scientist! A postdoc is where you can prove to the community that you are one!
- Come to me with projects and interests and start taking on roles without being directed
- Shows an interest in mentoring students
 - Creates projects and guides undergrads during the summer and grad students during the year
- Personally ambivalent on teaching - really depends on position...
- 1 publication that they start and end! Move from results to program



Postdoc to Research Scientist

Yale and Brookhaven National Laboratory



- Decided to continue with RHIC physics since I had a good head start
- Asked for a reference letter from one of the faculty at Yale when I tried to apply for faculty positions the first time
- When it didnt go through, tried for a fancy lab position again (at another lab), got *very* close to landing the job, but didnt work out
- My letter writer at Yale then asked if I wanted a job since they were going to have an opening
- What did I end up doing during my postdocs
 - convenership of one of the physics working groups
 - mentored multiple students for their phd analysis
 - started building a research program that I found interesting
- Built a high school outreach program... why?

Research Scientist to Faculty

One job to rule them all

- This is usually the big one! I knew that I wanted a tenure track job @ research institution
- First tried my hand at applying during fall 2019 (in the middle of my first postdoc)
- Learned a lot about how to think 'big picture' from that experience
- Created an agenda that is identifiable and unique amongst our community
- Decided that during fall of 2021 I was ready to test my luck again
- Applied to 4 positions, 1 interview, 1 job acceptance!
- Went with a proposal of science program + outreach that was brought something new!



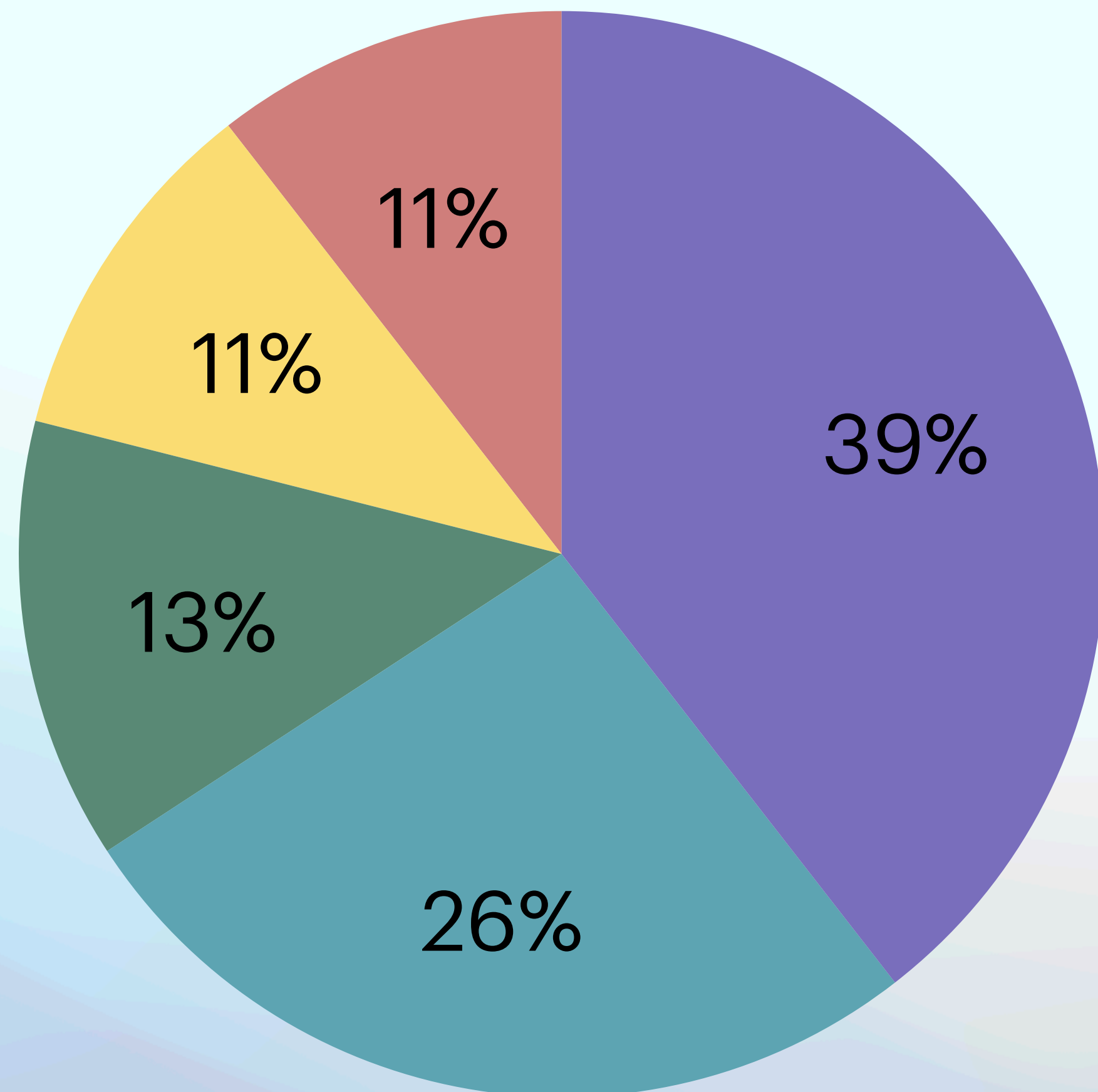
Assistant Professor @ Vanderbilt

Essentially a job that ive loved from day-1

- I socially transitioned during my second year at Yale but mainly to the group but not publicly
- Interviewed at Vandy presenting masc, got the job offer, signed it (worried about bias)
- Showed up as I am now since its a new place with a new start and new people who only know me as me :)
- First big conference Fall 2022 - "So Vanderbilt is now hiring diversity candidates..?"
- 2023 - DOE Early Career award, NSF supplement for JETSCAPE/XSCAPE, on two currently submitted NSF proposals one on AI and other on science outreach...
Fall 2024 - Ruff Fant Dean's Faculty Fellow @ Vanderbilt!
2 postdocs (one on RHIC, one on LHC), 4 PhD students, 4 undergrads, 2 high school students

What do I do now?

- online meetings
- teaching
- student meetings
- research
- grants



Meetings forever!

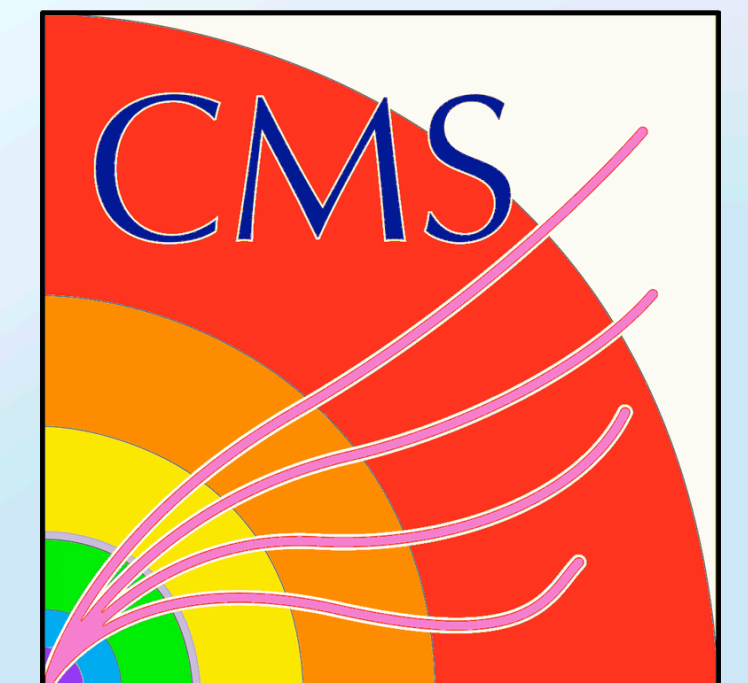


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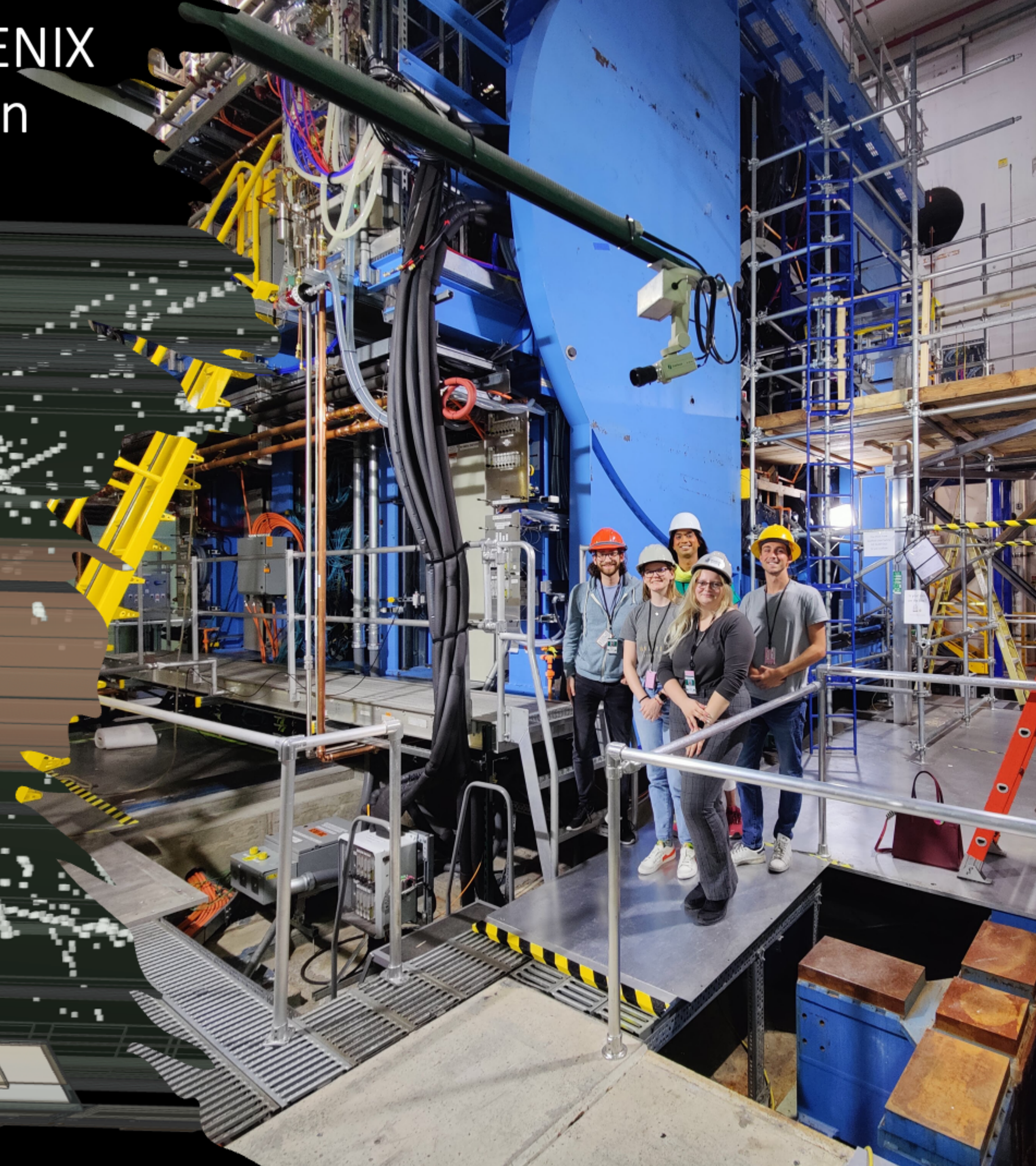


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Projection Chamber
with TPC
0771
= 200 GeV

RKE Group in front of the sPHENIX
detector located at Brookhaven
National Laboratory, New York





Science outreach to High School Students!

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To Get Kids Interested in Science, We Have to Let Them Do Science

A pilot program for high schoolers offers a blueprint in getting students involved in cutting-edge particle physics research

By Raghav Kunnawalkam Elayavalli on September 14, 2023



Simulating electron - proton collisions

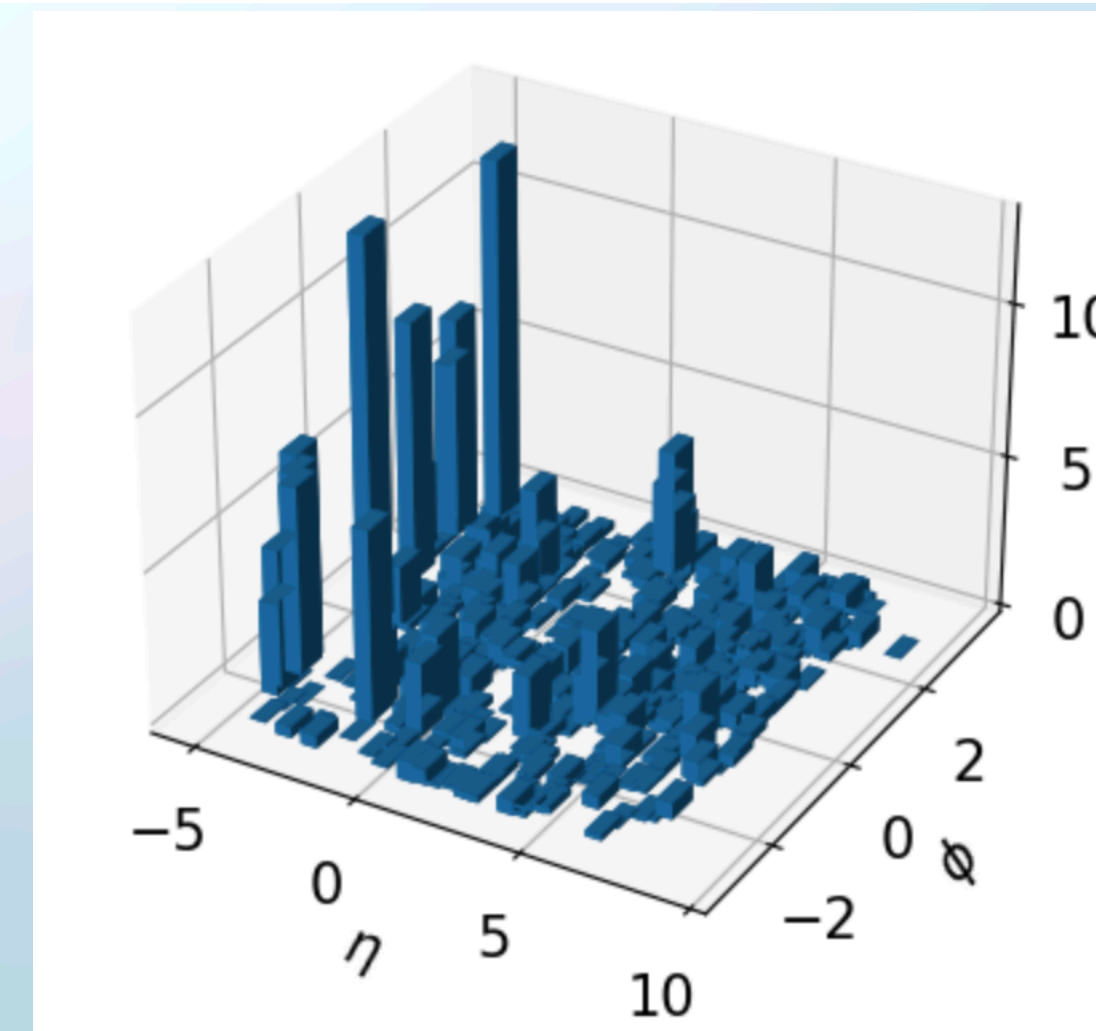
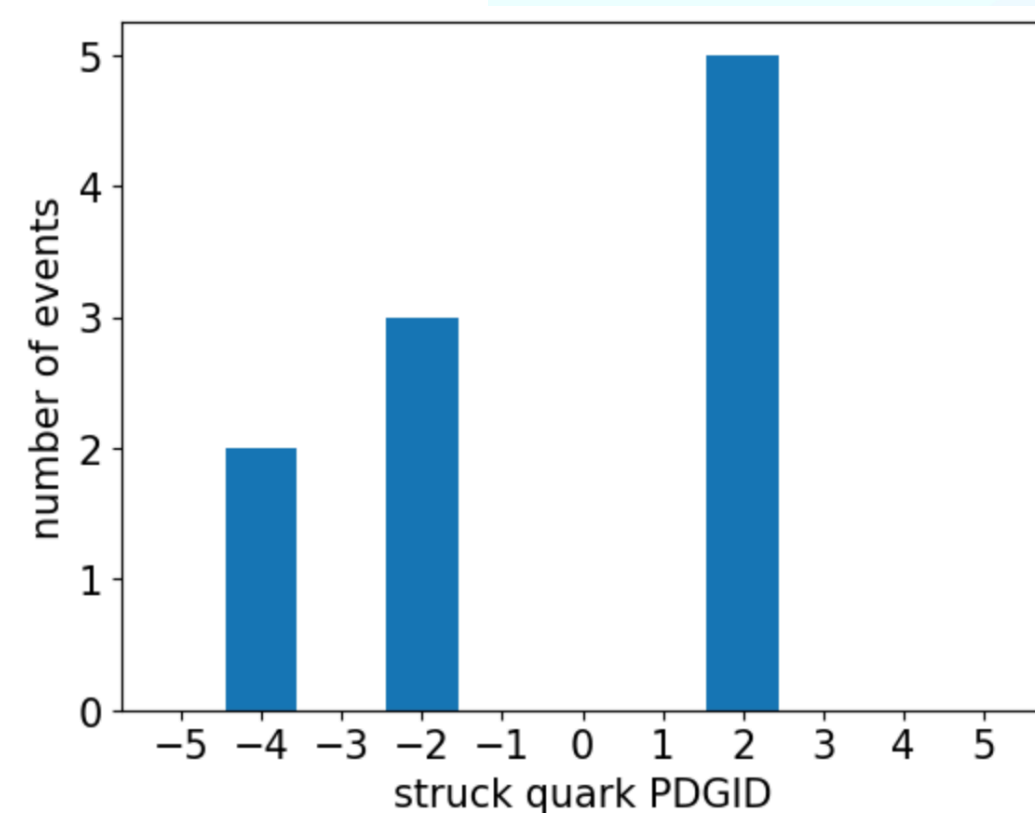
Day-1 : Introduction and first run

We will first initialize our simulation toolkit - PYTHIA (pythia.org) and run a few collisions of electrons and protons at varying energy and begin to study the output

```
In [2]: # Importing useful headers
import pythia8
import numpy as np
import matplotlib.pyplot as plt
import pandas as pd
```

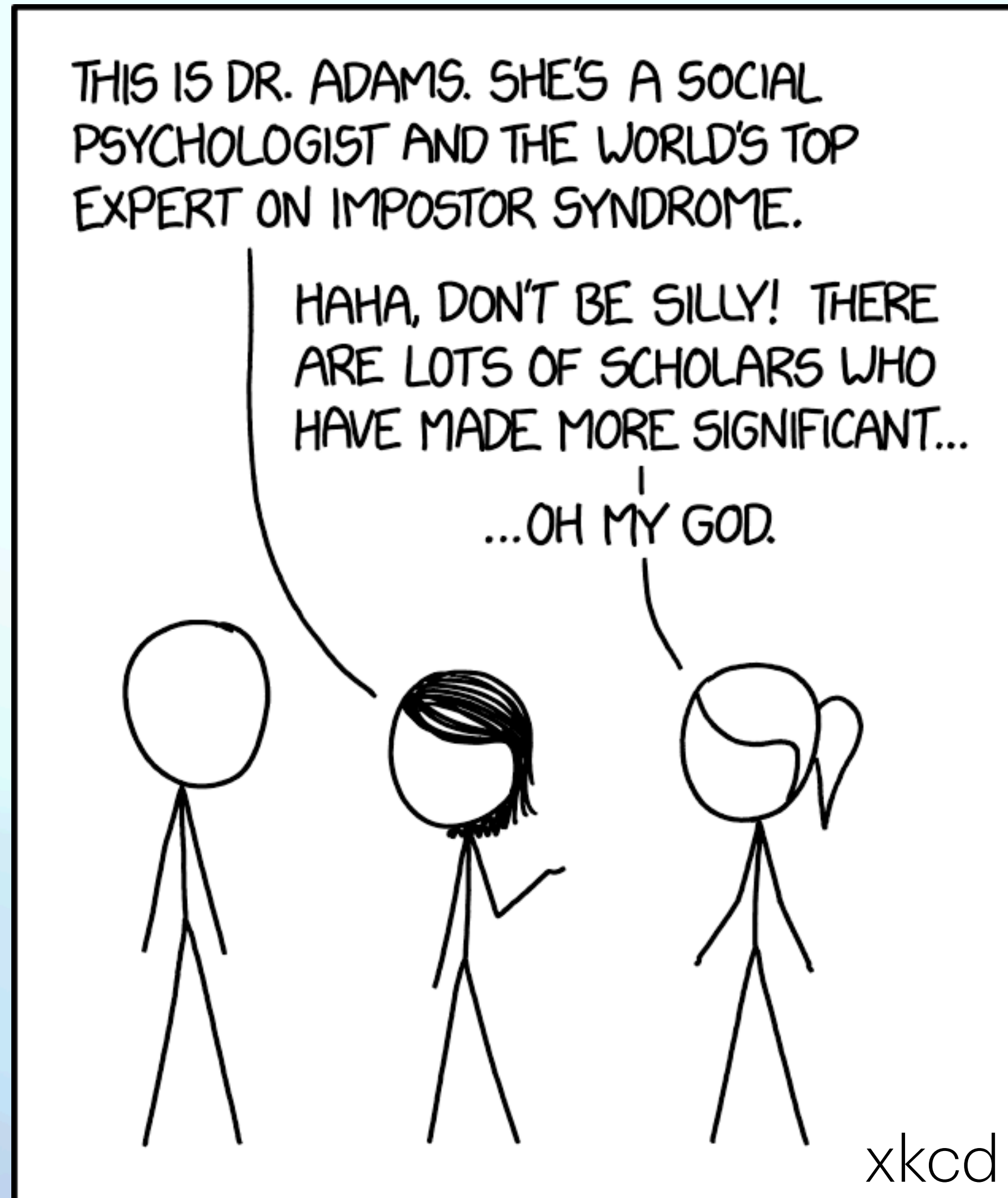
Initialize the pythia object and setup the type of collisions

```
In [3]: pythia = pythia8.Pythia()
#Set up incoming beams, for frame with unequal beam energies.
pythia.readString("Beams:frameType = 2")
```



... and along the way -

Imposter Syndrome!

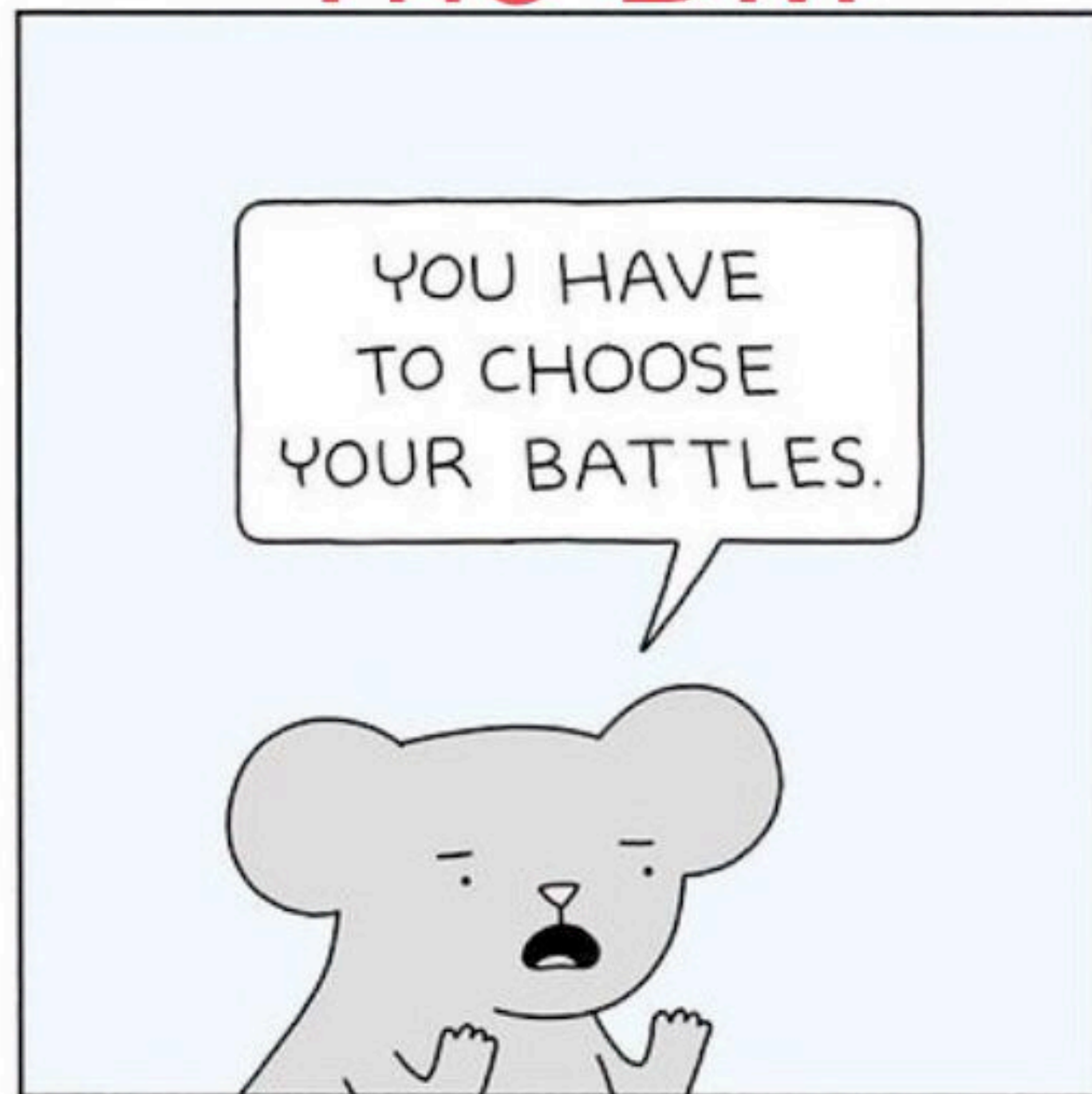


- In creative professions, this is relatively common. especially amongst folks with marginalized identities
- In my experience - it doesnt go away on its own... it just manifests differently
- You just get better at identifying when it pops up!
- Life moves on and you get to the next step

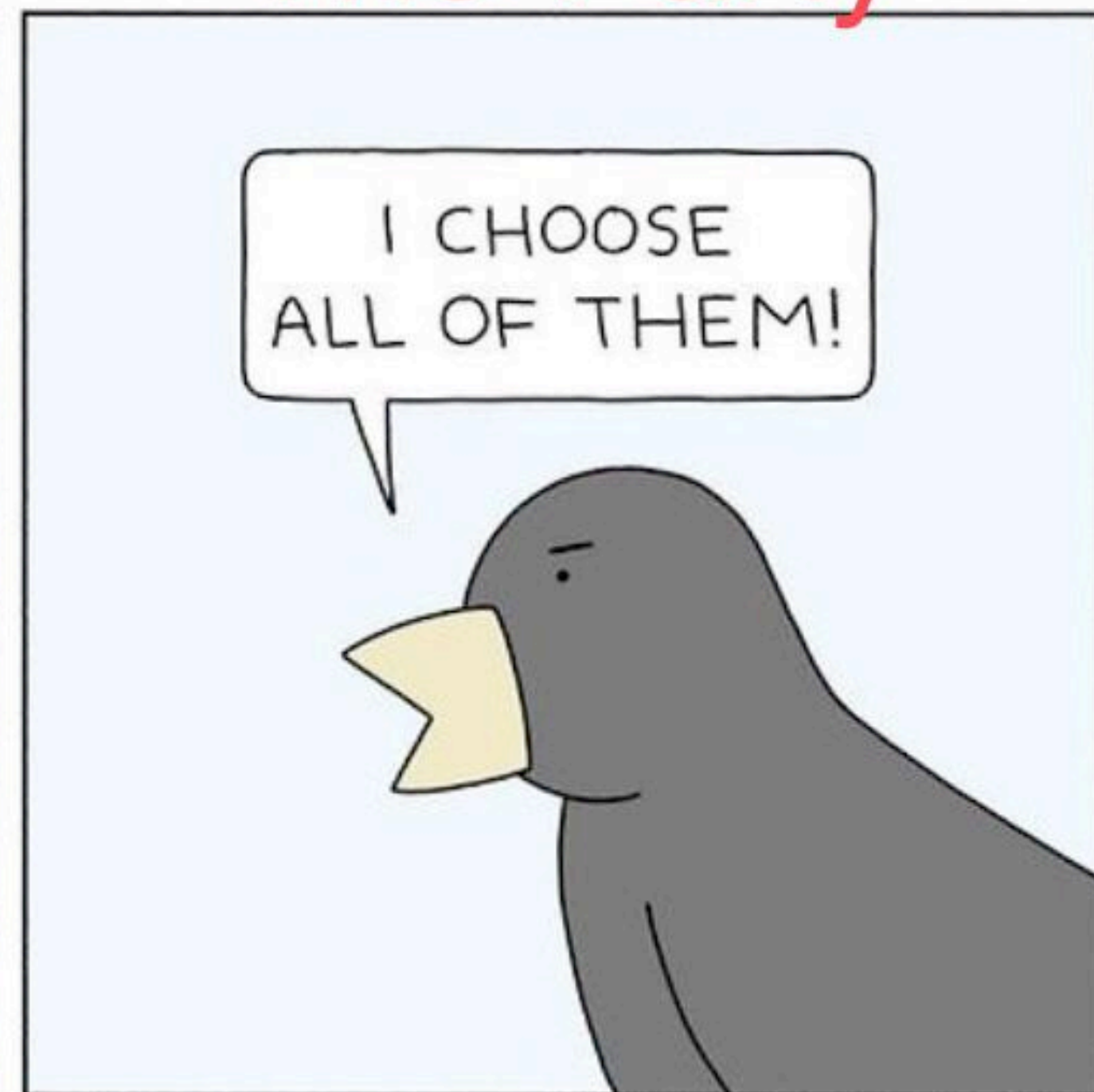
Battles!

Self-preservation and hierarchy of struggles

The DM



The Party



POORLY DRAWN LINES

- Some are more worth than others
- Some cost you a lot
- Some are necessary
- Many are irrelevant
- Few are critical
- Seniors are useful in this
- Allies fight on your behalf!

Focus on whats in your hands!

Thought exercise - what if you were your exp's SP now...

- In any job market, a lot of situations and decisions are not in your hands
- Sometimes its luck, sometimes its an unquantifiable feeling that leads some folks to be ranked differently
- What is it that you want to do? - teaching, analysis, outreach, building detectors...?
- What you have is your goal, your vision, your program that you build
- Sometimes you need to turn down some jobs in order to do what you like... (I know this is a silly statement but is possibly more relevant)
- Working with a person/group with a human interest story is way more important and useful to your career!



THE EVOLUTION OF INTELLECTUAL FREEDOM

