2023 QuarkNet Coding Camp 2

Time: Sunday, July 23 - Friday, July 28
We will share our work on the CC2 group document

Coding Fellows

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Welcome!

Thanks for wanting to spend a week of your precious summer with us. In return, we'll do our best to give you a truly valuable experience learning how to enrich your courses with coding and particle physics.

QuarkNet's Coding Camp 2 is a one-week workshop for teachers of high school physics and related topics to gain in-depth experience with fundamental computer programming skills and applications. Particle physics is used as the context for these learning experiences where teachers practice analyzing and visualizing data from high energy experiments with spreadsheets and python notebooks. Coding Camp 2 builds on teachers' prior exposure to programming through QuarkNet's Data Camp and Coding Camp 1 and broader professional development in particle physics, data science, and computational modeling.

Agenda

Sunday, July 23

- Plan on arriving at the hotel by 6pm. Communicate with Adam (info above) if you're having trouble and we'll get it sorted.
- 7pm meet in Residence Inn conference room or outside if the weather is good, short check in meeting
    - Quick activity
        - Determine the local magnitude and direction of the Earth's magnetic field. There are several good, free apps for this. PhyPhox is great if you don't have one already.
    - Light Dinner (around 8pm)
        - Pizza, vegetables, snacks

Monday, July 24

9AM meet in Residence Inn lobby to travel to Fermilab

- Get into carpool groups
    - Driving directions from the hotel to Fermilab Wilson Hall (the tall bldg, locals just call it "the highrise"). You'll need to enter this direction through the East Gate on Day One to get the business visitor badge from the guard at the gate. Have your QR code and ID ready!
- Head to Building 327. Here's a map. From Wilson Hall heading east, it's the last building on the left. We held Data Camp there for the past ~5 years, if it looks familiar.

9am-11:45am at Fermilab

- Welcome!
    - Have everyone introduce themselves
    - Structure of the week
        - student-hat: early in the learning cycle, this is for you to learn new things, some will be beyond what you'd have your students do
          BSCS 5E Learning Cycle
          QuarkNet Github
        - teacher-hat: later in the learning cycle, apply what you've learned to design a lesson for your course
    - Safety, bathrooms, coffee, shoes, lunch
- Begin student-hat activities in groups of 3 or 4
    - Discuss in your groups before beginning
        - *What helps make data visualization effective?*
        - *What tools have you used to make data visualizations in your class(es)?*
        - *What are their pros & cons?*
    - Data Viz notebook: Plot a function with linspace and customize plots with pyplot and mpl's object-oriented interface.
        - Users guide — Matplotlib 3.5.2 documentation
    - Reflect on data visualization with these questions for discussion in your groups
        - *What's useful from Same graph, different narratives from Betterposters*
        - *How about Salvaging the Pie from DarkHorse Analytics?*
        - *Anscombe's quartet*
        - *Datasaurus Dozen*
    - Finished early or want more? Investigate the code behind these plots from Son of a Corner.
    - Importing outside data sets Colab notebook

11:45am walk to lunch at Wilson Hall Cafeteria

12:45pm walk back to Building 327

- Complete Data Viz

2:30pm Guest speaker Nate Saffold, Lederman Postdoctoral Fellow
Sub GeV Dark Matter Searches with Skipper CCDs

3:30pm Share out
- Add your colab links to our CC2 group document
- Share a short gem or two from the conversations you had relating to data visualization today

4:30pm Wrap up
- Do the daily feedback form before you leave
- Dinner suggestions, optional

Around 5pm Leave Fermilab for Residence Inn

Tuesday, July 25

8:30am meet in hotel lobby to drive to Fermilab
9am Building 327 at Fermilab
- Questions from yesterday? Collect them here for the fellows or to crowdsource solutions from each other.
- More student-hat time: focus on B Field Variation notebook (make a copy in your own Gdrive)
    - Discussion on data storage: Github, A tutorial
    - How do you use Github or how would you like to use it?

9:30am DEI Discussion with Adam LaMee, APS PhysTEC
- STEP-UP program and their great classroom norms poster
- Videos
    - Byte-sized DEIJ short videos from the Alliance for Identity-Inclusive Computing Education (AIICE)
    - Coded Bias documentary on ethical concerns in AI
- Books
    - The Disordered Cosmos by Dr. Chanda Prescod-Weinstein
    - Algorithms of Oppression by Dr. Safiya Noble
    - Invisible Women by Caroline Criado Perez
    - Viral Justice by Dr. Ruha Benjamin
    - Unapologetically Dope: Lessons for Black Women and Girls on Surviving and Thriving in the Tech Field by Dr. Nicki Washington
- On the web
    - Dr. Chanda Prescod-Weinstein: site mastodon twitter
    - Dr. Timnit Gebru: site mastodon twitter

    - Dr. Margaret Mitchell: site mastodon twitter
    - Dr. Alex Hanna: site mastodon twitter
    - Dr. Nicki Washington: site mastodon twitter
    - Caroline Criado Perez site twitter
    - Dr. Safiya Noble: site mastodon twitter
    - Dr. Ruha Benjamin: site mastodon twitter
    - DAIR, Distributed AI Research: site mastodon twitter
- Looking to create a Mastodon account? Here's how:
    - It's sort of like email where you have an account with some host (like gmail or outlook) and can communicate with others on different hosts. There are even ways to move to a different host and keep your account, if you ever need to.
    - The host (or 'instance') you choose will have its own rules for discourse and what gets through from other instances. I'm on Hachyderm.io. It's an instance run by a wonderful group of mostly LGBTQ+ programmers and they filter lots of harmful instances with hate speech so my feed is way more pleasant than on other instances or platforms (like Twitter or facebook).
    - Many use a web browser to view it, even on mobile. There are some mobile apps, too.
    - Cool things about Mastodon:
        - it's free
        - your feed is only based on who you're following, what they post (toot), and what they 'boost' (share another's post). 'Liking' a toot only notifies the author and doesn't affect the post's visibility or priority.
        - There's no ads or algorithm that feeds you content it thinks you should see.
        - DMs and replies appear in your feed with everything else, but aren't visible to the public.
        - you can follow hashtags, like #iteachphysics

- Drop a read-only link to your Colab in this document: Share Out
    - Some folks have tips, advice, or activities to share that would benefit everyone, if you want to add your ideas to the same document, different tab, we'll set aside time on Thursday specifically for intergroup sharing

11:30 pm Lunch at Wilson cafeteria (drive to visit the science center afterwards)
https://www.clover.com/online-ordering/fermilab-caf---taher-batavia

12:30 pm Leave for Lederman Science Center

1:30pm Building 327 at Fermilab

- More student-hat time
    - Finish up the t' test activity comparing magnetic fields in 2 locations

        - Further discussion on stats: Holmes Statistics Summary
        - How much stats should we include in physics labs or classes overall?
    - Upload your completed activity as view only in the Share Out document

3pm Rebekah Randall: Neutrino Fellow and President of CSTA Indiana

- Neutrino Masterclass
- Neutrino fellows in development Colab notebook
- https://csteachers.org/
- Even Bananas youtube playlist

4pm Wrap up B Field

- Review and sum up B Field Variation notebook in groups
    - Learn how one person interpreted each line of pseudocode
- If you would like to compare your data analysis to the official readings from NOAA: https://www.ngdc.noaa.gov/geomag/calculators/magcalc.shtml?#igrfwmm

- Extra time? Start the final notebook on Model Fitting with Muon Tracks

- Do the daily feedback form before you leave
- Leave Fermilab around 5pm

Wednesday, July 26

8:30am meet in hotel lobby to drive to Fermilab
9am Building 327 at Fermilab

9-10:30 Working in building 327 at Fermilab

- More student-hat time
- Work on notebook on Model Fitting with Muon Tracks (under the Coding Camp 2 tab)
- For an extra challenge, try the Model Fitting with Muon Tracks Machine Learning

10:30am Scarlet Norberg: Postdoctoral Researcher at UPRM (snorberg@fnal.gov)

11:30am Lunch: Fermilab Cafeteria

- Photo file

1-2:30pm in building 327 at Fermilab

- Finish up the Model Fitting with Muon Tracks and drop a view only in the Share Out document

3pm Switch from *student-hat* to *teacher-hat*.

- Reevaluate the 3 activities you've worked on with your teacher hat on
  - How would you see this working in your class?
  - How would you change it?

4:00pm Do items 1 & 2 on the QuarkNet must-do page

- We'll omit items 3 & 5 and save item 4 (surveys) for Friday AM

- Do the daily feedback form before you leave

Leave Fermilab around 4:30pm

Thursday, July 27

8:30am meet in hotel lobby to drive to Fermilab
9am Building 327 at Fermilab

- code to help you do things in the QuarkNet Github
- Optional ML activity in the QuarkNet Github
- Beta versions of the worked examples are in the in_dev folder in the QuarkNet Github
- Implementation plans (Share Out)

- Teacher-hat time
  - How do you envision incorporating something you learned this week into your classes?
  - Discuss ideas with other teachers and share
  - Start developing your implementation plan

- Some ideas
  - Earthquakes
  - Sun Position
  - Elements
  - Word Analysis

10:30am tour of Wilson Hall (1 hour)

- Reopen Fermilab Petition
- Angela Gonzales Gallery
- Felicia the Ferret
- Moving Muon g-2 electromagnetic ring
- Micky Dolenz visits Fermilab

Some other things

- Svaha teacher discount
- Muon Collider Shop

Lunch: 11:130-12:30
https://www.clover.com/online-ordering/fermilab-caf---taher-batavia

12:45pm Building 327

- Share your draft implementation plan with your group
    - Spend about 5 min sharing/explaining/letting them try it out

2:30pm Dr. Bryan Ramson Neutrino Detection

3:30pm Building 327

- Plan for sharing something you've worked on, something you've done, a coding tip or a good idea you have in the Share Out document for Friday morning
- Add a link to your implementation plan in the Share Out document
- Do the daily feedback form before you leave
- Leave Fermilab around 4:30pm

Friday, July 28

8:30am meet in hotel lobby to drive to Fermilab
9am Building 327 at Fermilab

- Complete implementation plans and share links on the Share Out document, last tab!
- Work with each other to review, help edit, help with roadblocks, etc.

11:15am Lunch at Cafeteria

Photo!

12:30 leave for Building 327

1:00pm Final Sharing

- Share Out !
- Show your activity to the group and walk through w/ discussion, between 3-5 minutes - timer will go off at 5 minutes!

3pm Final Logistics and Wrap Up

- Workshop Evaluation When you submit it, you will get a link to a form you can download and fill out to turn in to your district for credit.
- Do items 1 & 2 on the QuarkNet must-do page
    - We'll omit items 3 & 5
- Annual QuarkNet Survey: teachers only need to do a survey once per year, so Coding Camp 1 or Data Camp folks can skip it
    - The full survey (15-20 min) is for any teacher who has not filled out the survey this summer yet

- Send gas, rental car, travel expenses to Anne Zakas.

Colab tip from Google Support: Notice template for schools when gathering parent or guardian consent

Colab parent/guardian permission request sample, generated by ChatGPT

Graduate credit is available through St Francis University
https://myusf.stfrancis.edu/portal/real/browse/202330?c=24
- You should register for REAL-696-I (QuarkNet Coding II)
- Once you register, you should receive confirmation from St Francis

Travel to Home

Before you travel to Coding Camp 2

Before you depart, see the ~~Teacher Travel page~~ for the various travel information and pre-camp to-do list we emailed you over the past few weeks. That also has the arrangements from the ***airport-to-hotel***.

Food and lodging

Residence Inn by Marriot has free breakfast in the lobby. You'll be on your own for other meals, but you do get a per diem of ~ $40/day for food (no need to keep receipts). Fermilab has a great cafeteria open for breakfast and lunch with several hot and cold options at reasonable prices. Teachers will usually coordinate carpooling to go to dinner or have food delivered to the hotel.

Driving directions from the hotel to Fermilab Wilson Hall (the tall bldg, locals just call it "the highrise"). You'll need to enter this direction through the East Gate on Day One to get an official name tag from the guard at the gate. Have your QR code and ID ready!