

Greetings, Campers!

We are looking forward to seeing all of you this summer. This document will help you to prepare for the week and give you an opportunity to ask questions.

There is a lot here. We've tried to keep it short. Read this a few times. It may help.

What: QuarkNet Data Camp 2019

Who: 24 QuarkNet teachers from across the country

When: 14-19 July 2019

Where: Fermilab, Batavia, Illinois

Why: a “crash course” in particle physics, and the many ways it can enrich your classroom

\$\$\$: Travel costs + \$500 stipend + \$32 per diem

Summary of information below:

Pages 2-3: Logistics: hotel, plane tickets, food

Page 4: Outline of camp goals; expected prior knowledge; suggested prep activities

Page 5: Implications for teaching; long term implementations; contact info

Action Items:

1. Book flight with Shelly Gutierrez
2. Let us know if you want to take the graduate course
3. If you need to borrow a laptop, tell us.
4. Look over the “What Should You Know” section and (maybe) do some preparing.
5. Look for another email soon that links to a comfort survey, to help us with grouping.

Logistics

Hotel

We are staying in the Residence Inn by Marriott:

28500 Bella Vista Parkway, Warrenville IL 60555

Phone (630) 393-3444

<http://www.marriott.com/hotels/travel/chinv-residence-inn-chicago-naperville-warrenville/>

Your rooms will be directly billed to Notre Dame, and reservations are already taken care of. You will be responsible for incidental costs in the room. There is a complimentary breakfast buffet each day that includes eggs, breakfast meats, cereal, oatmeal, fresh fruit, juice, coffee, a waffle maker and bagels/pastries.

We pay for Sunday through Thursday night at the hotel, except in cases where you need to book a flight that leaves Saturday morning. If you want to arrive earlier than Sunday, or leave later than Saturday morning, you are of course free to do so but must make your own reservations and pay for the room.

Meals/Reimbursement

After Data Camp has concluded, Anne Zakas (zakas.1@nd.edu) will be collecting your travel forms and receipts from the trip for reimbursement. A per diem of \$32/day will be given for two meals, and there is also a stipend of \$100/day for the five workshop days.

Fermilab has a cafeteria-style restaurant on the premises, with reasonably priced and diverse selections including a salad bar, made-to-order sandwich station and several hot food stations. You can purchase food there both for breakfast and lunch, or you can bring your own food and eat it in the dining room there.

Transportation between airport and home

We will reimburse the travel and parking costs, so please save any receipts from expenses incurred, such as parking garage fees at the airport, tolls, etc.

Transportation while attending Data Camp

We will rent several cars/vans and use these to transport campers to/from the lab/hotel. You can also use these to organize trips that come up during the week. Drivers will be determined once all arrival times and airports are known, since you'll be grouped this way for maximum convenience.

Getting to Batavia

Please let Anne Zakas (zakas.1@nd.edu) know if you'll be driving to the meeting, since she will be reimbursing your mileage expense.

To book your flight, contact Shelly Gutierrez from Anthony Travel at ShellyGutierrez@anthonytravel.com or by phone at 574-631-4224-- she will book all air travel, which will be billed to Notre Dame. Shelly needs the following info from you ASAP:

1. --City of departure and return
2. --Date of departure and return
NB*: plan to arrive at lab no later than Sunday, early PM. You can return home either Friday late PM or Saturday morning, depending on available flights.
3. --Name exactly as it appears on your photo I.D.
4. --Date of birth
5. --Cell/home phone number
6. --Seating preference
7. --Mileage number if you have one with final airline

Daily Schedule

You will be at the lab each day from 8:30-17:00. There will be talks and tours (**bring closed-toe shoes!**) and time to work on the project described below.

*There will be a brief introductory session held at the hotel on Sunday 14th at 7:00pm. This is the reason for making sure you arrive by early PM.

Graduate Credit/ PD credit

3 Graduate credits (category: natural science) will be offered through the University of St. Francis. Enrollment is done online, and one of the assignments you'll complete for the course will be directly related to work you do during the camp; the other assignments are typical for an online education course. The cost is approximately \$100 per credit, or \$300 total.

Regardless of whether you register for the course, you will receive a statement from FNAL that participation in the camp is equivalent to 37.5 hours of professional development credit, certified by the Illinois State Board of Ed, which some of you may be able to use for re-certification purposes.

Laptops

Bring 'em if you can. Let me know right away if you wish to borrow one, and we will try to obtain them from FNAL. Tablets are OK, but some of the interactive websites we will use are not optimized for phones/tablets (especially those requiring Java/Flash), and data entry in spreadsheets is tedious on a tablet. **An internet-capable phone will not be sufficient.**

What we will do.

- We will study data collected by the CMS detector in early running of the LHC. You will work in groups to analyze these data and seek any patterns that might arise from the measurements. The group will work independently to study the questions that define the project. We will be available for advice as needed.
- We will also explore our newest initiative: the QuarkNet Data Portfolio (<https://quarknet.org/data-portfolio>). This is a collection of classroom activities that allows students to explore physics by analyzing primary source data--or data that they collect themselves through experiment.
- Throughout the week, you'll also get a chance to tour various sites on the lab grounds, including the most recent and exciting experiments, and you'll also hear talks from some physicists who work on these experiments.
- *We place a high emphasis on group work: for almost the entirety of the workshop, you'll be in small groups of 3-4 teachers, and will seldom be working alone. Please be prepared to work collaboratively, and suppress the usual physics teacher urge to play in your own corner of the sandbox!*

What should you know before you arrive?

We built the project assuming that you understand a few physics concepts and can apply these to new situations:

- Momentum is conserved (and is a vector).
- Energy is conserved (and isn't a vector).
- Mass and energy are equivalent.
- Charged particles moving across magnetic field lines feel a force.
- Adding vectors isn't the same as adding integers. It isn't rocket science either.

We also assume some ability with a spreadsheet application:

- Column arithmetic
- Simple scatter plots
- Histograms
- Simple statistics

Notice that this list doesn't assume any prior knowledge of the Standard Model, nor how particle detectors work, nor how accelerators work. We'll provide the highlights of those as you need them, but of course it would help to know a little about them before you come.

Some of you might be familiar with QuarkNet's "Data Activity Portfolio" website, containing several activities/lessons intended for use in the high school physics classroom. If you can complete the task titled "Calculate the Top Quark Mass" ([link](#)) then this is a pretty good indicator you've got a solid background. If not, don't panic 😊

If you feel uncomfortable arriving to the camp without some more background knowledge, you could try reading the information on some of the following websites. Some of them contain tons of information (particle adventure, quantum diaries, Matt Strassler's site) and if you're able to spend extended time on these sites you'll learn a lot.

- <http://www.particleadventure.org>
- <http://home.cern/topics/large-hadron-collider>
- <http://www.fnal.gov/pub/science/particle-accelerators/index.html>
- <http://www.quantumdiaries.org/2010/02/14/lets-draw-feynman-diagrams/>
- <https://profmattstrassler.com/new-start-here/>
- https://indico.cern.ch/event/197461/contribution/0/attachments/290954/406673/CMS_4July2012_Final.pdf

So what?

We have designed the week to be an effective model for science teaching and professional development. We won't spend a lot of time talking about what inquiry-based teaching looks like. Instead, you will be breathing it during the week. Many participants find it useful to spend time considering how the week can have an effect on their own teaching.

We expect that you will try some of the activities in the Data Activity Portfolio and give us feedback on them. To that end, we provide time for you at the end to develop a plan for implementation that you can take back to your classroom. We'll also ask you for feedback during the year so you can let us know how well it went, and make suggestions to help us improve the DAP activities.

You'll get another email later that asks you to provide us with your background information so that we know more about the group. It helps us in the planning.

Please let us know if you have additional questions that we haven't addressed here.

Best regards,

The QuarkNet Teaching & Learning Fellows
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