Fermilab & QuarkNet: Remote Learning in Action

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International Particle Physics Outreach Group Collaboration Meeting

7 May 2020

Helping Teachers and Parents

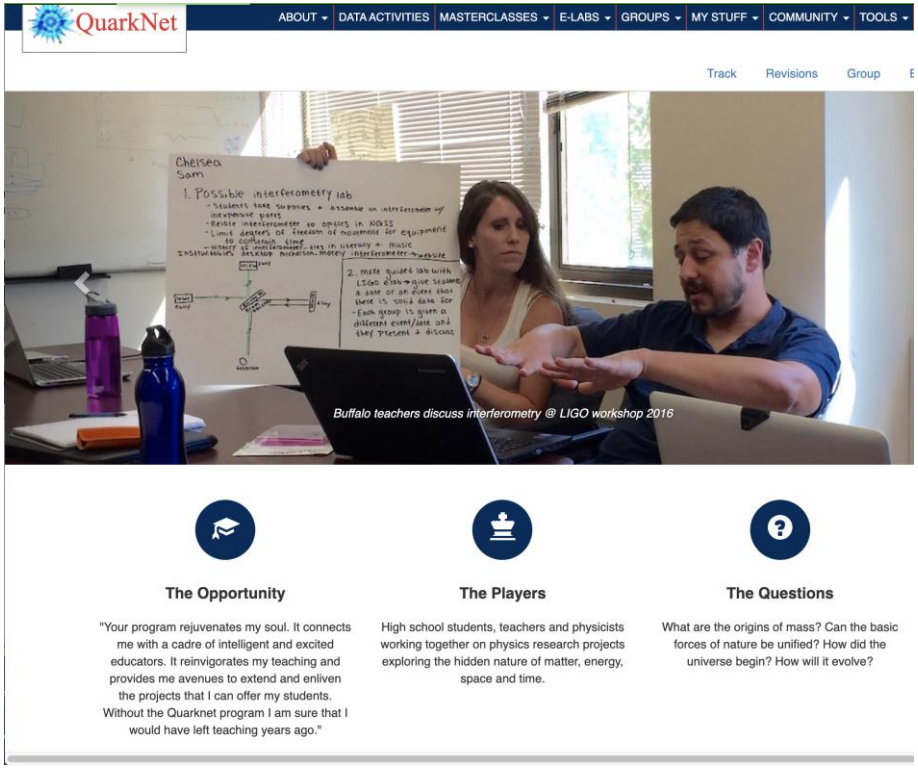
In the transition to the current remote learning environment, the Fermilab Education and Outreach office and QuarkNet determined:

- We were already well-placed to start supporting teachers and parents in the work of remote learning, and
- We would be expanding our online offerings.
- Teachers have long seen us as a reputable resource.

Helping Teachers and Parents

Both Fermilab and QuarkNet have rolled out new remote support for teachers, students, and parents.

In this talk, we'll describe new and expanded efforts rolled out over recent months and some future plans.



Fermilab

Who have been the Fermilab education office's core audiences and how have we reached them?

- Teachers bringing students for field trips and attending teacher workshops
- High school students attending like the STEM Career Expo and Saturday Morning Physics
- Young students who come for Science Adventure classes
  - And their parents!
- The general public interested in learning more physics or about Fermilab

Fermilab

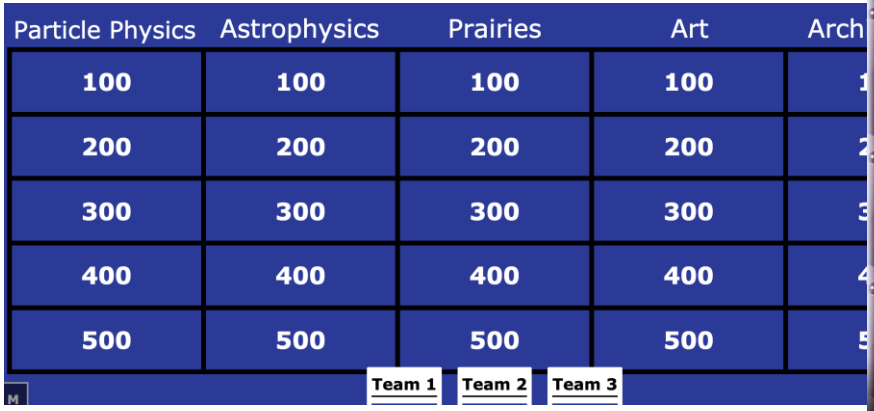
What are the best ways to reach those audiences virtually and what new audiences might we now have?

- Teachers: Looking for high quality online content for students learning from home
- High school students: Virtual learning opportunities like those previously available in person
- Young students and their parents: Fun and engaging at home science and information on how to help kids learn.
- Everyone: Use of social media and looking for interactive educational opportunities.

What is Fermilab offering?

New ways to virtually connect to the lab

- Resources gathered at our new “Families” webpage:
  - Grid of activities for students from grades 3–12, using the 5E education model to connect them into coherent strands. Helpful for those learning from home.
  - Recreating in person experience with virtual resources from the Lederman Science Center
  - Guidance for parents new to working with students at home



What is Fermilab offering?

Online versions of Fermilab Education Office events:

- The remaining classes from the Winter Saturday Morning Physics session were held on later dates as online events
- The STEM Career Expo for high school students will be held virtually; the office has recorded five panels to date and will be posting them soon

Winter Session, 2020

January 9, 2020 | aearly

Share Tweet Email

Please go to ed.fnal.gov for information regarding the cancellation of the remaining Winter 2020 session.

Lecture topics and dates are subject to change. The schedule will be updated accordingly.

Schedule of Online Lectures held via Zoom

Date	Lecture Topic	Speaker, Affiliation	Video Link
24-March-20	Informal Q&A – Standard Model	SMP Team	Video of Zoom Q&A on March 24
3-April-20	Galactic Astrophysics	Noah Kurinsky, Fermilab	Video of 4/3 Zoom Lecture
10-April-20	Extragalactic Cosmology	Adam Anderson, Fermilab	Video of 4/10 Zoom Lecture
17-April-20	Energy and Climate	Dan Hooper, Fermilab	Video of 4/17 Zoom Lecture
23-April-20	LHC Physics Keynote Presentation	Karrie DiPetrillo, Fermilab Christian Herwig, Fermilab Alexx Perloff, University of Colorado Boulder	Video of 4/23 Zoom Lecture
1-May-20	Nuclear Physics	Bryan Ramson, Fermilab	Video of 5/1 Zoom Lecture

What is Fermilab offering?

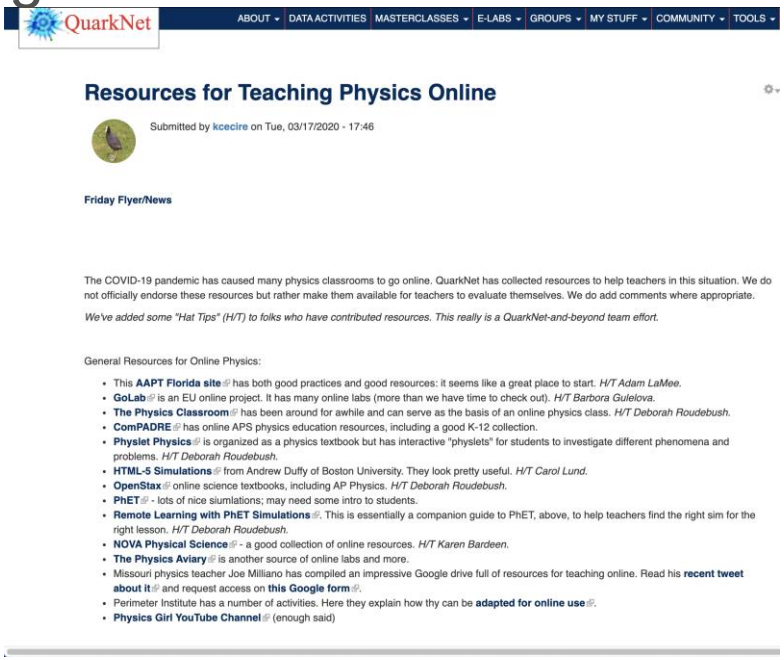
Social media engagement:

- We have ramped up our Twitter offerings to include the very popular "#CanYouGuess" feature, in which we ask our followers a question about particle physics, as well as:
  - #FNALFieldFinds and #FNALTreeID: natural science features captured in our backyards
  - #FNALatHome: activities for parents and kids to do together
  - #DidYouKnow: facts about Fermilab science and education

QuarkNet

QuarkNet's audience is primarily high school physics teachers; the QuarkNet program is focusing on providing them resources to enhance their teaching:

- Created a central page of resources from QuarkNet, Fermilab, and a wide variety of organizations dedicated to physics education; updated often
  - General Resources for Online Physics
  - Resources from Fermilab
  - Particle Physics Resources



QuarkNet | ABOUT | DATA ACTIVITIES | MASTERCLASSES | E-LABS | GROUPS | MY STUFF | COMMUNITY | TOOLS

Resources for Teaching Physics Online

Submitted by kcecire on Tue, 03/17/2020 - 17:46

Friday Flyer/News

The COVID-19 pandemic has caused many physics classrooms to go online. QuarkNet has collected resources to help teachers in this situation. We do not officially endorse these resources but rather make them available for teachers to evaluate themselves. We do add comments where appropriate.

We've added some "Hat Tips" (H/T) to folks who have contributed resources. This really is a QuarkNet-and-beyond team effort.

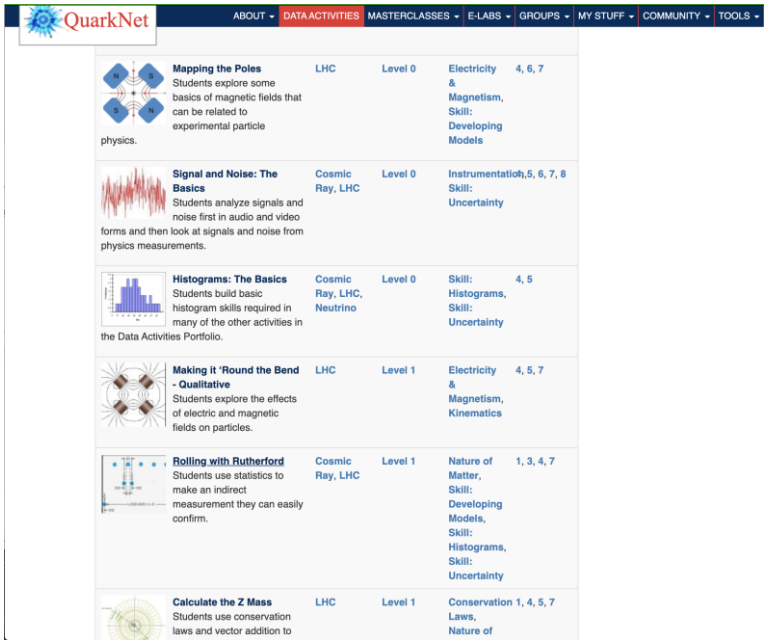
General Resources for Online Physics:

- This **AAPT Florida site** has both good practices and good resources: it seems like a great place to start. *H/T Adam LaMee.*
- **GoLab** is an EU online project. It has many online labs (more than we have time to check out). *H/T Barbora Gulelova.*
- **The Physics Classroom** has been around for awhile and can serve as the basis of an online physics class. *H/T Deborah Roudebush.*
- **ComPADRE** has online APS physics education resources, including a good K-12 collection.
- **Physlet Physics** is organized as a physics textbook but has interactive "physlets" for students to investigate different phenomena and problems. *H/T Deborah Roudebush.*
- **HTML-5 Simulations** from Andrew Duffy of Boston University. They look pretty useful. *H/T Carol Lund.*
- **OpenStax** online science textbooks, including AP Physics. *H/T Deborah Roudebush.*
- **PhET** - lots of nice siumlations; may need some intro to students.
- **Remote Learning with PhET Simulations**. This is essentially a companion guide to PhET, above, to help teachers find the right sim for the right lesson. *H/T Deborah Roudebush.*
- **NOVA Physical Science** - a good collection of online resources. *H/T Karen Bardeen.*
- **The Physics Aviary** is another source of online labs and more.
- Missouri physics teacher Joe Milliano has compiled an impressive Google drive full of resources for teaching online. Read his **recent tweet about it** and request access on **this Google form**.
- Perimeter Institute has a number of activities. Here they explain how thy can be **adapted for online use**.
- **Physics Girl YouTube Channel** (enough said)

QuarkNet

QuarkNet's audience is primarily high school physics teachers, so the QuarkNet program is focusing on providing them resources to enhance their teaching:

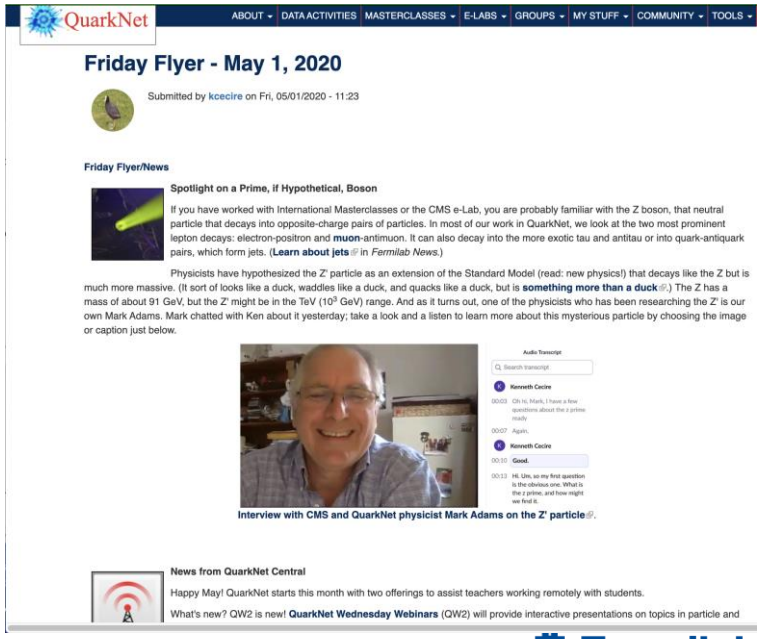
- Added a page of resources to help teachers and students do cosmic ray analyses online and another for CMS data
- Encouraging teachers to share ideas in the Data Activities Portfolio for adapting activities for online use
  - Staff wrote up their own ideas
  - Added comments in the portfolio
  - Made a centralized page to collect it all and make it public



QuarkNet

QuarkNet's audience is primarily high school physics teachers, so the QuarkNet program is focusing on providing them resources to enhance their teaching:

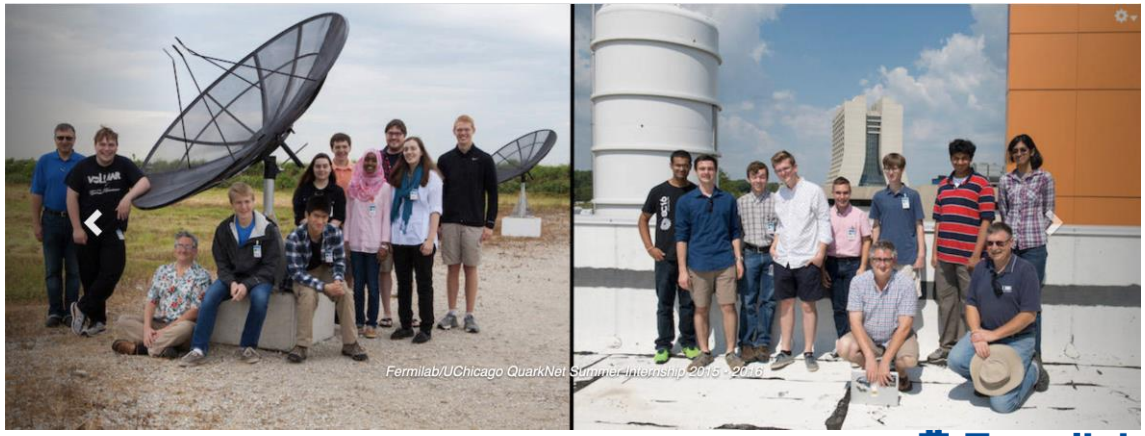
- Have modified the focus of the Friday Flyer:
  - "Spotlight" section has moved away from focus on QuarkNet centers to more topical items
  - "Resources" section points to external items of interest
- BAMC – covered in IMC talk
- Kicked off QW2 this week: a webinar series for teachers and students about particle physics



QuarkNet

QuarkNet's audience is primarily high school physics teachers, so the QuarkNet program is focusing on providing them resources to enhance their professional development:

- Retooled an upcoming workshop for QuarkNet fellows:
  - Initially planned to help fellows better support in-person workshops at centers this summer
  - Now focused on working with fellows to help them help centers transition to remote workshops
- Creating an online summer program on particle physics topics for teachers led by a Fermilab physicist



Summary

- Fermilab and QuarkNet both adding and expanding online and remote learning resources rapidly.
- Both serving as both resources and hubs for different audiences (with some overlap).
- Continuing to create, and always looking for more to share with teachers and students!