Friday Flyer - December 17, 2021

Submitted by kcecire on Mon, 12/06/2021 - 10:15

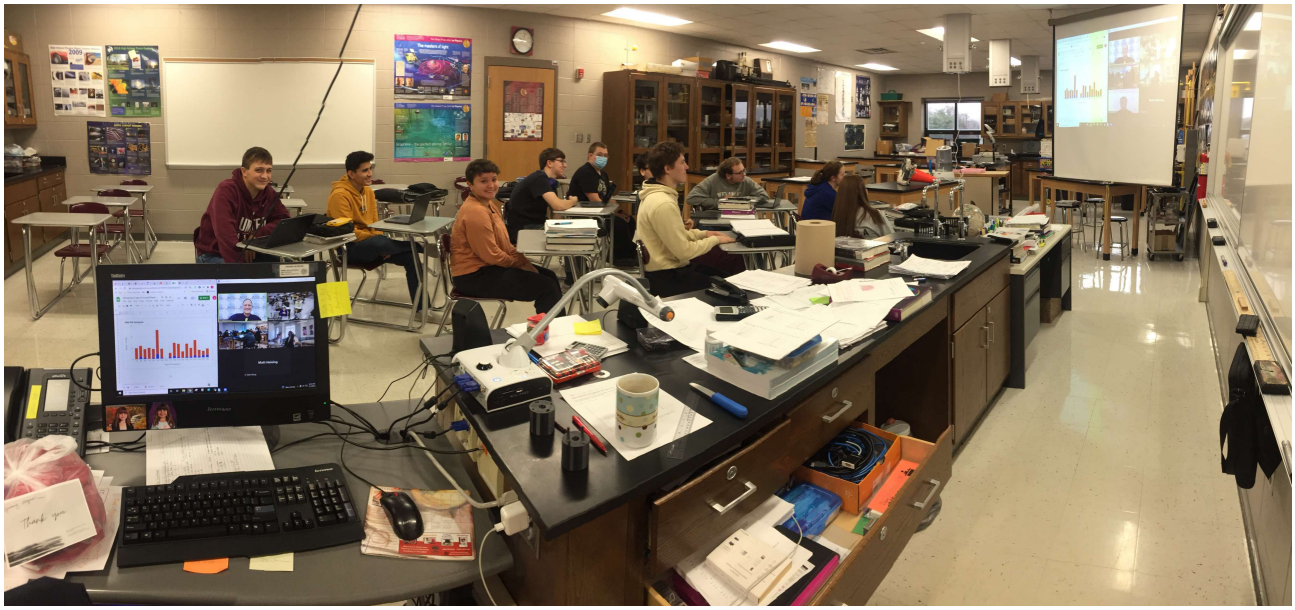
LHC Fellows Workspace (/group/lhc-workspace)

Spotlight on an Eventful Year

This year was was supposed to be the year of recovery from the **annus horribilis (https://www.thefreedictionary.com/annus+horribilis)** of 2020. Well, yes and maybe. The endemic pandemic came and went and came again. QuarkNet and the teacher members had to be flexible. Some worked together on this in **QuarkNet Educational Discussions (QED) (https://quarknet.org/content/quarknet-educational-discussions)**. Others networked more informally or in their centers. International Masterclasses (IMC) 2021 in February and March were largely virtual, with students connecting from home, but they did come off well, albeit with smaller numbers than in 2019. International Muon Week in March also fared well as cosmic ray studies began to recover. Also in early 2021, QuarkNet-India was built online in collaboration with Life Lab Foundation.

As we approached May and June, QuarkNet again offered the Big Analysis of Muons (BAM), which had been born of the lack of access to IMC in 2020. This time, it was broader - including ATLAS as well as CMS measurements - and a bit more relaxed. The summer of 2021 provided a window in which we were able to have a combination of virtual, in-person, and hybrid QuarkNet workshops. A great example was at the Johns Hopkins University Center, a hybrid workshop run by mentor Morris Swartz and lead teachers Jeremy Smith and Kevin Martz that featured very good attendance in both forms as well as on-site activities mixed with online learning. Minnesota pioneered the **NOvA (https://novaexperiment.fnal.gov/)** masterclass in an in-person workshop while Virginia had a great online coding workshop which also featured a joint **TOTEM (https://quarknet.org/data-portfolio/activity/totem-data-express)** activity with Kansas State. Speaking of 0's and 1's, we had two fully subscribed and successful Coding Camps this past summer. The best part of all this for QuarkNet staff was being able to visit centers not only via videoconference but, this year, on-site. It was great for the staff to be able to facilitate workshops at centers again!

This autumn, more and more students returned to our schools. QED came back after a summer off. International Cosmic Day was a success in November and just this month we completed World Wide Data Day (W2D2). What happens 2022? Stay tuned!



Jeremy Wegner's students at Winamac High School (Notre Dame Center) in their W2D2 videoconference.

News from QuarkNet Central

Reminder for teachers using Google Colab! Starting two weeks ago, individuals who use Google Workspace for Education accounts have been restricted from using Colab until their organization's admin enables access in the control panel. Learn more at **Google Workspace Admin Help (https://support.google.com/a/answer/11254550)**. When Colab is enabled, all students in your organization over the age of 13 have access. If you have questions, contact **Adam LaMee (mailto:adamlamee@gmail.com)**.

Repeated because it is so cool: Joseph Farah, who is a former student of LHC fellow Michael Wadness, is a recipient of an **APS 2021 LeRoy Apker Award (https://aps.org/programs/honors/prizes/prizerecipient.cfm?last_nm=Farah&first_nm=Joseph&year=2021)**, "For the invention of the selective dynamical imaging method, with applications for studying rapidly varying black holes." (You can even read about this inspiration in **Joseph's contribution (https://quarknet.org/sites/default/files/MikeWadness_MA_studentJosephFarah.pdf)** to ***QuarkNet Stories from the Classroom*** **(https://quarknet.org/content/quarknet-stories-classroom)** from a few years back!)

We have a holiday feast of upcoming events and dates:

- **The latest International Masterclasses (IMC) Circular (https://www.physicsmasterclasses.org/downloads/Circular6-20211217.pdf) is now available**, hot off the electronic press. Inside, you will find links to the four available IMC schedules, including the **Fermilab schedule (https://quarknet.org/content/videoconferences)**. The Doodle polls for LHC and Neutrino masterclasses are closed: registration continues via email with Uta or Ken.
- **Beamline for Schools (BL4S) (https://beamlineforschools.cern/) registration is now open!** In BL4S, teams of high school age students propose their own experiments to run in a CERN beamline. The winning team(s) actually go to CERN to make their measurements with expenses paid by BL4S. (H/T Barbora Gulelova.)
- Early bird registration for the virtual 2022 AAPT Winter Meeting (January 6-8) is closed; **regular registration (https://aapt.org/Conferences/WM2022/registrationpage.cfm)** continues and is actually not much more expensive.

- Spring 2022 registrations for **Saturday Morning Physics (https://saturdaymorningphysics.fnal.gov/)** are open. The deadline is **January 14, 2022**.
- Want to learn more about neutrinos? (Of course you do!) Consider attending the Kavli Institute for Theoretical Physics program **Neutrinos as a Portal to New Physics and Astrophysics (https://www.kitp.ucsb.edu/activities/neutrinost-c22)** on **March 26**, online or in-person. Registration is free and, if you decide to go in-person, financial aid for travel and lodging is available. (H/T Adam LaMee and Quynh Lan Nguyen.)

Physics Experiment Roundup

Fermilab News has the large and the small of it: on one hand, **construction has started (https://news.fnal.gov/2021/12/dune-collaboration-starts-production-of-components-for-its-gigantic-neutrino-detector/?utm_source=newsletter&utm_medium=email&utm_campaign=ft-211208)** for components of the giant detector for the Deep Underground Neutrino Experiment (DUNE) and, on the other, Fermilab scientists have determined that it is not good to have even **slightly dirty qubits (https://news.fnal.gov/2021/12/sqms-researchers-discover-performance-limiting-nanohydrides-in-superconducting-qubits/?utm_source=newsletter&utm_medium=email&utm_campaign=ft-211216)** (not to be confused with **cubits (https://en.wikipedia.org/wiki/Cubit)**).

Bear with us here, but: We know the lifetimes of J/Psi and Upsilon and Pions - all three; and B-mesons and Kaons and W and Z; but, do you recall, that we just don't know it for the Higgs boson at all? Well, CMS, that red yoke detector, is now hunting it down; and the collaboration just might find it, to their great renown. **Find out more (https://home.cern/news/news/physics/cms-homes-higgs-bosons-lifetime?utm_source=Bulletin&utm_medium=Email&utm_content=2021-12-09E&utm_campaign=BulletinEmail)** from *CERN Bulletin*. And apologies to Johnny Marks.

After that, we need just a little astro, right this very minute: read in *APS Physics* how **general relativity survived the pulsar test (https://physics.aps.org/articles/v14/173?utm_campaign=weekly&utm_medium=email&utm_source=emailalert)**.

Resources

We mentioned this a fortnight ago, but it really is the time of year where we start thinking of "best of" lists for the departing year. Last time, we gave you how *symmetry* identifies **10 particle physics and astrophysics books of 2021 (https://www.symmetrymagazine.org/article/physics-books-of-2021)**. This time, we have **10 ways Fermilab advanced science and technology in 2021 (https://news.fnal.gov/2021/12/ten-ways-fermilab-advanced-science-and-technology-in-2021/?utm_source=newsletter&utm_medium=email&utm_campaign=ft-211217)** from *Fermilab News*.

Big Questions! With 2021 rumblings about lepton universality, *symmetry* has been asking **what's up with those leptons (https://www.symmetrymagazine.org/article/are-leptons-all-alike?utm_source=newsletter&utm_medium=email&utm_campaign=ft-211208)**? *Fermilab Today* has a new video to

entertain the question **How do Fermilab engineers build big science? (https://www.youtube.com/watch?v=486tO1fXk9g)** In the latest *Even Bananas* video, Kirsty Duffy and crew ask, **Why do tacos exist? (https://www.youtube.com/watch?v=t1Wl2gobL9E)** Interestingly, that last question is the biggest of all.

Just for Fun

Holidays are upon us, in case you have not noticed, and so we get a little whimsical. We start in the spirit of some of the lists above with the **Twelve Days of Star Trek (https://www.youtube.com/watch?v=85n9ye73DjE)**. And what is the season without **The Physics of Santa Claus (https://www.forbes.com/sites/startswithabang/2015/12/20/the-physics-of-santa-claus/?sh=6a095c3c1e80)** (*Forbes* edition)?

For a little more seasonal cheer, here is the **CERN ecard (https://home.cern/news/news/cern/send-cern-e-card?utm_source=Bulletin&utm_medium=Email&utm_content=2021-12-09E&utm_campaign=BulletinEmail)** as presented by *CERN Bulletin*.

What else can we give our students as we go home (or wherever) for the holidays? *WIRED* suggests **Holiday Physics Homework (https://www.wired.com/2014/12/holiday-physics-homework/)**, a sure-fire favorite. And we at FF suggest you stuff those stockings so that wide-eyed children, full of wonder, can delight in PDFs of the December editions from this year, both the 17th and the **3rd (/sites/default/files/FF_03dec2021.pdf)**, as well as classics from **2020 (/sites/default/files/FF_08dec2020.pdf)** and **2019 (/sites/default/files/FF_13dec2019.pdf)**. What fun!

OK, for real fun, Star Wars fans deserve a video too. **And a parade (https://www.youtube.com/watch?v=B2lLLWU4PIg)**.

Have a wonderful holiday season and a great start to 2022! The Friday Flyer will return on January 7, 2022!

QuarkNet Staff:
Mark Adams: **adams@fnal.gov (https://mail.google.com/mail/?view=cm&fs=1&tf=1&to=adams@fnal.gov)**
Ken Cecire: **kcecire@nd.edu (https://mail.google.com/mail/?view=cm&fs=1&tf=1&to=kcecire@nd.edu)**
Spencer Pasero: **spasero@fnal.gov (http://spasero@fnal.gov)**
Shane Wood: **swood5@nd.edu (https://mail.google.com/mail/?view=cm&fs=1&tf=1&to=swood5@nd.edu)**

Additional Contacts (https://quarknet.org/content/quarknet-contacts)