

QuarkNet Staff Monthly Report

June 2020

Centers

Ongoing Staff Efforts – The COVID-19 pandemic has affected the world in so many ways, including the closure of facilities and a switch to online education for most U.S. schools, colleges, and universities. The staff has been devoted to finding ways to help QuarkNet teachers during this time. Among the first and most important of these efforts by Shane, Spencer, and Ken was the production of a page on the QuarkNet website devoted to [Resources for Teaching Physics Online](#). Quickly followed is six QuarkNet Zoom Channels for Videoconferencing on the Notre Dame account that teachers can use to facilitate contact with students and each other.

All Centers – Spencer, Shane and Mark held two hour-long planning and Q&A sessions on Zoom for mentors: one on June 18 and one on June 23. The purpose of these sessions was to help mentors plan summer experiences for their teachers during this unique time when face-to-face workshops are not possible for most centers.

In addition to ongoing contacts and discussions, staff reports the following activities:

QuarkNet Summer Session for Teachers (SST) – Spencer, Shane, and Ken met online with Fermilab physicist and Notre Dame PhD Allison Reinsvold Hall on Zoom once per week in June to plan the six-class Summer Session that Allison is giving in July for 50 QuarkNet teachers. The QuarkNet staff members helped Allison choose data activities, come up with ideas, edit slides, and put the classes on quarknet.org.

QuarkNet Wednesday Webinars (QW2) – QW2 finished with a presentation on Cosmic Ray Studies by Mark Adams on June 3 and a talk on the Event Horizon Telescope project by Joseph Farah on June 11. Joseph is the only undergraduate who is part of the collaboration and was the student of fellow Mike Wadness in high school.

Boston Group – Ken sat in on the online preparation session for SST (above) that Rick Dower held for Boston QuarkNet teachers on June 30. About four other teachers attended.

Fermilab/University of Chicago – Spencer and Shane met with George Dzuricsko on June 26 to discuss plans for the center's Muon Virtual Workshop coming up on July 28–30.

Florida State University – Shane met on Zoom with Ted Kolberg and two lead teachers on June 22 to discuss plans for the summer virtual workshop that will be offered on the mornings of July 22–24. The center plans to partner with the University of Florida center to offer a workshop on machine learning and online teaching tools.

Kansas State University – Spencer and Shane co-facilitated the first Virtual Neutrino Data Workshop of the summer via Zoom for KSU on the mornings of June 22–24 with Rick Dower, Paul Sedita, and Jeremy Wegner. These fellows met with Ken, Spencer and Shane on the evening of June 24 to debrief the virtual workshop to discuss what went well and to make recommendations for changes to future virtual workshops.

Lawrence Berkeley National Laboratory – Ken met with Tony Spadafora and Laurie Kerrigan online on June 17 to begin planning for their annual summer workshop. They agreed that Ken would pilot a “Big Analysis of Muons in ATLAS” along with QuarkNet data activities for the students and teachers.

Purdue University – Mark discussed a possible cosmic ray workshop with Marla Glover, although Purdue decided to reschedule summer activities to Saturdays in the fall.

University of Illinois at Chicago – Nate Unterman, Mark (UIC) and Edmundo Garcia (Chicago State University) decided to hold a virtual summer workshop July 13–15 focused on cosmic ray analysis. Mark discussed responses to reviewers’ questions and the recalculation of muon rates for the Eclipse paper in *The Physics Teacher* with Jacob Miller on May 27. Collaborators completed a second article in *The Physics Teacher* covering the MUSE experiment during a final editing session on May 27.

University of Notre Dame – Ken participated in Monday online Notre Dame QuarkNet Center virtual meetings all month in addition to virtual meetings with Pat Mooney and several other teachers to plan a course for students to run in July. Jeff Chorny and Ken are in charge of the first week of the two, and Ken is adding the particle physics content.

University of Puerto Rico at Mayaguez – IMC moderator and UPRM physicist Sudhir Malik worked with Adam LaMee and Jeremy Smith to run a virtual workshop for teachers in Puerto Rico on data analysis with Python and Google Colab on June 20. While two of the teachers were from the UPRM QuarkNet Center, this was not primarily a QuarkNet workshop, as it was funded out of the IRIS-HEP program of which Sudhir is a part. Ken subsequently met online with Adam, Dan, and Sudhir on June 25 to discuss possible collaboration between IRIS-HEP and QuarkNet.

Vanderbilt University – Working with Bill Gabella, Ken and Shane facilitated a shortened virtual neutrino workshop in the mornings of June 25 and 26.

Virginia Center – Deborah met with Phil Rubin and Joshua Erlich to complete the Center Feedback form. The group also agreed on a three-day meeting August 3–5.

Cosmic Ray Studies

Statistics from e-Lab: 923 cosmic ray uploads; 31 cosmic ray plots; 1 cosmic poster during May 27–June 29, 2020.

Mark provided help desk assistance for teachers on the following topics: data sets for “simple” experiments; GPS updates; identifying the cause of blank data files; debugging unphysical gate configurations on DAQ; adjusting discriminator levels; DAQ simulation app; and lists of hardware resources. Mark continued to collect muon speed data with DAQ 6674 located in his home. Mark performed a T0 calibration, implemented results in geometry files, and calculated muon speeds. The uploaded data has become part of a stable data set for cosmic ray analyses for the entire classroom. They developed additional analysis activities in e-Lab. Teachers may use these for remote learning, and fellows may use them in virtual summer workshops.

Edit Peronja and Mark continue to make progress on the new Lifetime module’s logic flow. Edit monitors for errors in threshold file creation at upload/split time. She has tagged failures for further investigation. In preparation for a webinar on June 3 using the Cosmic Ray e-Lab, Edit corrected the e-Lab search coding so that it functioned correctly under guest logins.

LHC Physics

The two main sessions of the Big Analysis of Muons in CMS (BAMC) masterclasses were finished by June, but there was substantial follow-up. Ken made certificates of participation for teachers and some undergraduate students upon request. Also, he accommodated smaller BAMC sessions for the Wheeler School in Providence, Rhode Island, the University of Utah outreach program, and a group of students at the University of New Delhi. Ken has started work on a Big Analysis of Muons in ATLAS (BAMA). See the information on Lawrence Berkeley National Laboratory above.

Fellows

The LHC and Neutrino fellows met online every Wednesday in June. Among the topics discussed were plans for QuarkNet Wednesday Webinars, the upcoming Summer Session for Teachers, and revision/updating of the MINERvA Neutrino Masterclass and the CMS Masterclass websites. In addition, fellows worked with staff to plan and adapt summer virtual workshops.

Most Cosmic Ray fellows attended their virtual fellows monthly meeting on June 24, 2020, held for the first time via Zoom. Topics discussed were: summer workshop plans; improvements to the virtual agenda template; need for planned breaks during longer virtual meetings; simplified e-Lab experiments for classrooms and workshops; future funding for Cosmic Watch purchases; and ideas for new e-Lab analyses based on barometric pressure, Large Array studies, and possibly a search for cosmic rays being blocked by the sun.

Data Activities Portfolio

Deborah is working on revisions to the QuarkNet STEP UP activities based on input from staff and the participants at the QuarkNet STEP UP virtual workshop.

Deborah had a meeting with Jeremy to discuss the method for turning the Jupyter Notebook materials from coding camp into a series of activities for the Data Activities Portfolio.

Increasing Diversity

Deborah added a new Curriculum Topic: Diversity & Inclusion to help teachers locate the QuarkNet STEP UP activities. Ken, Shane, and Deborah also developed an implementation survey for making follow-up inquiries easier.

Deborah posted the *QuarkNet Changing the Culture* activity based on the STEP UP *Guidelines for Discussion* poster as well as the *QuarkNet STEP UP Careers in Physics* activity. Deborah completed the revisions on the *QuarkNet STEP UP Women in Physics* activity and posted it to the Data Activities Portfolio.

Deborah and Shane facilitated a virtual workshop for six QuarkNet STEP UP Ambassadors on June 19-20. The ambassadors will be called upon to lead QuarkNet STEP UP workshops for centers.

The QuarkNet staff had a discussion on June 10 to explore ways to better reach out to teachers in schools with populations of students who are underserved in science and mathematics. The discussion resulted in several suggestions and a plan to do a needs assessment among such teachers who are close to QuarkNet centers or AAPT meeting sites. In addition, Mark, Ken, and Kathy Race participated in a Zoom meeting with two Illinois Institute of Technology faculty members on outreach on June 22. Deborah and Shane participated in the APS diversity webinar on June 24. Mark also had discussions with UIC HEP faculty on June 28 about recruiting minority graduate students from their center partner at Chicago State University.

Ken, Shane, Deborah, and Adam developed a draft planning document for implementing a pilot effort for helping centers reach out to underrepresented teachers and teachers of underrepresented students for the above-mentioned needs assessment.

Broader Impacts

International Collaborations – Ken met on Vidyio with the IPPOG group working on the new IPPOG website on June 3. They discussed overall design and the need for qualified people to help curate activities from the IPPOG database. Ken nominated several people from IPPOG, including Spencer Pasero, other international colleagues, and these QuarkNet teachers: Mike Fetsko (Virginia), Marla Glover (Purdue), Joel Klammer (Virtual), Kevin Martz (Hopkins), Maria Niland (Virginia), and Mike Wadness (Boston). Ken also co-facilitated the International Masterclasses Steering Group meeting with Uta Bilow on June 19. Topics included the IPPOG website, an ALICE masterclass USB kit, and a report on what IMC has been doing related to the COVID-19 situation, including the masterclass make-up videoconferences on June 26.

AAPT – Deborah, Ken, Shane, and Spencer submitted abstracts for contributed talks on topics related to remote learning at the virtual AAPT Summer Meeting. These talks are spread across several days ensuring high visibility for QuarkNet programs.