

QuarkNet Staff Monthly Report Activities of February 2020

Centers

Ongoing Staff Efforts – Ken, Spencer and Shane developed the 2020 RFP form for center leads to indicate plans for 2020 and to request funds and/or national workshops led by a staff or fellow. As of the end of February, nearly 40 centers had responded. Staff compiled requests, discussed via videoconference, then approved funding levels. Anne sent funding letters to these centers while staff continue to ping center leads who have not yet responded to the RFP.

Jeremy, Mark, Spencer, Ken, and Shane evaluated nearly 40 QuarkNet teacher applications for CERN summer teacher programs. They selected eight to attend either the High School Teacher (HST) program or the International Teacher Weeks (ITW) program at CERN.

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

Hampton University/College of William and Mary/George Mason University of America – The teachers met with Phil Rubin at Centerville High School, Virginia, on February 29. Ken connected on Vidyo to help them with the new version of the CMS masterclass.

Kansas State University – The KSU teachers met with Bharat Ratra on February 29 for masterclass orientation and other activities. Ken connected online to assist with the new CMS masterclass and take questions. Mark is working with Amy Hageman to try to repair her DAQ issuing incorrect dates.

Lawrence Berkeley National Laboratory – Ken connected online with Tony Spadafora and another ATLAS physicist to discuss LBNL participation in International Masterclasses.

Purdue University – Ken met lead teacher/mentor Marla Glover and a new teacher online to discuss the new CMS masterclass on February 15.

Rutgers University – Ken met two Rutgers physicists who will lead a MINERvA masterclass via Zoom on February 27.

University of Hawaii – Ken connected by Vidyo with lead teacher Tiffany Coke to review the new CMS masterclass on March 26. Michael Jones identified uploaded files containing future dates; Mark informed the CRMD's owner of the problem and offered suggestions for repair.

University of Illinois at Chicago – The MUSE (Muon Underground Shielding Experiment) group continued to address analysis issues in preparation of a publication. Mark met with Jacob Miller, the student finishing *The Physics Teacher* article on the 2017 Eclipse project, to draft answers to all reviewers' comments. New limits and adding improved errors to all plots is still underway. Ken arranged for a masterclass with UIC-CSU center participants and students from Horizon Science Academy at Chicago State University on April 3. Themes for the summer cosmic ray workshop are under discussion.

University of Minnesota – Shane connected with Greg Pawloski to plan the agenda for the MINERvA masterclass in April.

University of Notre Dame – Ken participated in weekly teacher meetings on February 3 and 24. Topics of discussion included the outreach for Science Alive in South Bend, masterclasses, and the summer program.

University of Oregon – Staff members continue to work to increase the usage of CRMDs or to collect unused CRMDs. Mark has been working with Rey Frey, and Shane has been contacting teachers, while Dave has been coordinating detector shipping and repair.

Virginia Tech Center – Ken met with lead teachers Rebecca Jaronski and Rob Culbertson on Zoom on February 19 to introduce the MINERvA neutrino masterclass.

Cosmic Ray Studies

Statistics from Cosmic Ray e-Lab: 841 uploads; 27 plots; and 6 cosmic ray posters during February. Help desk assistance was provided on the following topics: reestablish EQUIP port connections; uploads with wrong GPS dates in future; and plans for new CRMD training.

Mark collected data with Fermilab WH15W detectors for muon flux and for multi-muon large array studies. He also operated a stacked DAQ 6674 collecting golden samples for testing the new lifetime module. Edit and Mark made progress via e-mail on the new lifetime module d. A draft of the code is under study in the development server. Ken and Dan Kallenberg visited Fermilab to discuss CosmicWatch detectors with Dave and Mark: experiences; construction; and goals. They outlined a plan to construct twenty detectors at Notre Dame next summer. They discussed an alternative processor to the Arduino in order to support displays and readout simultaneously. High school student Tyler Strohl has constructed two unique counters (pointer and veto) to create a handheld cosmic ray telescope with fine angular precision. Both counters are operational and he has demonstrated that he can use both the signal size and veto to improve rejection of two-muon backgrounds. Tyler also provided feedback on the cosmic telescope to be used at the Family Open House. Dave has assembled three CRMD kits. Mark is communicating with the recipients' mentors to develop teacher e-Lab training plans. Dan Kallenberg has accepted an invitation to join the Cosmic Ray Fellows group.

LHC Physics

Ken scheduled ATLAS and CMS masterclasses and orientations. He contacted all mentors and tutors of CMS masterclasses worldwide to update them on the changes to the measurement tools. Ken made a CMS webcast for mentors and tutors on February 19 and was online on February 20 for CMS masterclass question time.

Neutrino Physics

Ken scheduled MINERvA masterclasses and orientations. Ken, Spencer, and Shane, in consultation with MicroBooNE physicist Sowjanya Gollapinni, decided to postpone the debut of the MicroBooNE masterclass until Summer 2020, giving more time for development and enabling testing by QuarkNet teachers in summer workshops.

Data Activities Portfolio

Deborah sent Kathy the updated list of activities and advised her of the changes in the search features of the Data Activities Portfolio. Deborah developed a statement of QuarkNet Workshop Best Practices to support fellows leading QuarkNet workshops with support from Ken and Shane.

Deborah, Ken and Shane held several scheduled phone conferences to discuss data activity documents and to plan new activities.

Increasing Diversity

Deborah, Shane and other QuarkNet STEP UP ambassadors attended one of the monthly STEP UP conference calls in February. These calls included discussion on how STEP UP lessons and *Everyday Actions* could be shared with QuarkNet teachers during summer workshops.

Broader Impacts

International Collaborations – Ken worked with his collaborator Uta Bilow on Vidyo on February 11 on coordination of International Masterclasses, set to begin at the end of the month. As mentioned earlier, Ken also did CMS masterclass webcasts and question time. The participants were mentors and tutors from various countries.

Outreach – Dave and Mark operated a cosmic ray telescope at Fermilab's Family Open House on Sunday, February 9. Sixty-five elementary students, with their parents watching, collected and recorded data for a cosmic ray muon zenith angle measurement. A live time-graph was created from their combined efforts. Tyler Strohl also demonstrated the telescope to students. Mark mentored Tyler on February 5 and 19 (with high school's outreach organizer Marsha Brown), and February 24.