QuarkNet Annual Report
Southern Methodist University
Summer 2019

The SMU Particle Physics group sponsored its annual QuarkNet teachers' workshop July 29-31. This year we hosted a group of 13 teachers, mostly from Dallas area public and private schools, many of whom were attending QuarkNet for the first time. This is also the first year that the QuarkNet workshop was incorporated as a capstone for those completing our Master Physics Teacher Certificate https://www.smu.edu/Dedman/Academics/Programs/masterphysicsteachercertificate

During the first two days, Shane Wood from Notre Dame led the Neutrino Data workshop. After hearing an introductory lecture from neutrino researcher and SMU professor Thomas Coan, the teachers visited a control room - one of 15 around the world - for the NOvA experiment which measures oscillations of muon neutrinos produced at Fermilab. They saw the near detector (at Fermilab) sampling cosmic ray muons in real time; the much larger far detector is located in northern Minnesota. With Shane, teachers then performed a couple of simple data activities as warm-ups before performing an analysis of MINERvA masterclass data and discussing how they could implement it in their classroom.

On the third day, SMU professor Jingbo Ye led the teachers in performing a new electric field mapping lab that he has developed for SMU's undergraduate introductory physics labs. In this way the QuarkNet teachers could provide valuable feedback on its eventual implementation.

Tammy McDaniel brought the weather balloon project her students had carried out and showed the GoPro video of its ascent to 40,000 ft. Kevin Carter showed examples of how to use 3D printing to enhance interest in the classroom, including a several iconic items from science fiction. John Thompson presented a video analysis app for constant velocity and acceleration cars. Former QuarkNet teacher (now college instructor) Janee Hall came to present on Ocean Sound and had the teachers perform an activity to demonstrate how the speed of sound varies at different depths in the ocean. *The SMU QuarkNet center is organized by Dr. Simon Dalley and funded by the National Science Foundation.* http://smuphysicsweb.wixsite.com/quarknet