

QuarkNet Annual Report 2020

University of Florida

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The UF QuarkNet Center successfully managed to hold a vibrant and interactive virtual workshop over 3 half-days this summer, July 22-24, because of the restrictions imposed by the COVID-19 pandemic. The center was rejuvenated with the recruitment of 5 new local teachers, who joined Ms. McHugh-Lowther who took the helm as lead teacher for our Center this year. The workshop was held using the Zoom video-conferencing platform. The teachers had pre-workshop assignments to fill in: a survey of their interests and technical skills, and technologies at their disposal.

The theme of the July UF workshop was on CMS data analysis, with a special session focused on machine-learning and artificial intelligence that was held in conjunction with the Florida State QuarkNet center. Prof. Acosta kicked things off the first day with a presentation about the CMS experiment and the physics program at the LHC, which was followed by several activities adapted to the online environment (Rolling with Rutherford, for example). The second day had teachers work in small Zoom breakout groups to calculate the mass of individual Z boson candidates recorded by CMS and ATLAS. This transitioned to an analysis of CMS dimuon data using python programming on the Google Colab notebook environment. Histograms were created to highlight and discover particles that decay in this channel.

The final day featured an overview and a computational activity on machine learning and artificial intelligence, again using the Google Colab platform. This session was held joint with the FSU QuarkNet Center (a first!), and featured UF graduate student Alex Roman who guided us through the mathematics of machine-learning, and how to train the computer to recognize handwritten digits as a classic application. Prof. Acosta showed some of the applications of machine-learning to data analyses in high-energy physics.

Overall the experience was wonderful for all of the teachers involved, and that as difficult as the distance was, the workshop went even more smoothly over Zoom than could have been expected. A popular feature of the workshop was holding a social hour over Zoom at the end of each day. This gave a chance for teachers to interact with one another, and also for the Tallahassee and Gainesville groups to get acquainted. We think future in-person workshops should routinely include a half-day Zoom session with another QuarkNet center, as the opportunity to meet and collaborate was positively received.

The agenda and activity links for the workshop are available here:
<https://quarknet.org/content/cms-data-analysis-virtual-workshop-uf-2020>

A Zoom screenshot taken during the workshop is included below:

