

## **Annual Report 2017**

### **SUNY at Buffalo QuarkNet Center**

**Mentors: Prof. Ia Iashvili and Prof. Avto Kharchilava**

**Faculty: Prof. Rappoccio**

SUNY at Buffalo (UB) has joined QuarkNet in early 2006. Mentors of the group are UB experimental High Energy Physicists, Prof. Ia Iashvili and Prof. Avto Kharchilava. The group has sponsored its 11<sup>th</sup> annual QuarkNet Summer Workshop at UB during August 16-18. This year we had 6 teachers taking part in the Workshop: two lead teachers (David McClary and Larry Hiller) who have been with the center since the beginning, and four returning teachers. Mr. Shane Wood (QuarkNet National Staff) visited Buffalo on August 17 – 18 to hold CMS e-lab part of the workshop.

The workshop had the following format. The first day was dedicated to general presentations on latest CMS results and QuarkNet. Mr. Shane Wood (QuarkNet National Staff) joined the Workshop for the following two days. On August 17<sup>th</sup>, we gave presentation on CMS experiment. This was followed by various activities: particle cards, penny mass experiment and Z mass exercise. Finally, teachers performed CMS data analysis using the CMS e-lab. On last day, teachers created e-lab posters and exchanged ideas about how to incorporate HEP topics in their classroom instructions. We also exchanged ideas on how to improve on preparations for Masterclass with students.

Earlier this year, on March 25<sup>th</sup>, UB QuarkNet center participated in the CMS Masterclass. 11 students from two high schools (Nichols School and Kenmore West High School) were divided in groups to analyze  $Z \rightarrow ee/\mu\mu$ ,  $W \rightarrow ev/\mu\nu$  events using CMS event display. Different groups analyzed different sets of data and compared their findings. At the end of the data analysis session, students combined results to measure relative fraction of Z events compared to W events, ratio of  $W^+$  over  $W^-$ , and to check lepton universality. They have created distributions of various quantities. Students also “discovered” Higgs boson and low mass resonances,  $J/\Psi$  and  $Y$ . Finally, students shared their findings with other participating schools.