Update on the BigBite Gas Ring Imaging Cherenkov (GRINCH) Detector for BigBite

SBS Meeting, 12-Sept-2018
October SBS Review Format

- Detector: BigBite Gas Cherenkov for $10^{-2}$ π/e separation
  - 510 array of 1” PMTs
  - Timing clusters using VETROC
  - $\text{C}_4\text{F}_{10}$ gas at 1 atm; pion threshold 2.7 GeV/c
    - Simulation shows marginal performance with CO$_2$
    - SHMS Cherenkovs 2x below simulation, not understood
    - B. Sawatsky “You would be insane not to use heavy gas.”

T. Averett, C. Ayerbe-Gayoso, M. Satnik, William and Mary
B. Wojtskehowskik, E. McClellan, A. Camsonne, Jefferson Lab
S Danagouliam, A. Amidouch, NC A&T
G. Niculescu, I. Niculescu, JMU
J. Annand, R. Mongomery, Glasgow

Current Status

• Mechanical assembly complete

• Installed in BigBite detector stack, TED building

• Gas leak around door; work in progress

• HV and signal patch cables installed on BigBite

• All DAQ electronics in portable rack, being assembled for testing

• HV system fully functioning

• All cables in-hand

• 50% of long cables and repeaters installed between BigBite and rack

• Software development in progress
DAQ results-LED w/prototype
C. Ayerbe-Gayoso, E. McClellan

hRise_53

hADC_53

ADC53 vs ToT53
• **William and Mary commitment:**
  - Deliver a completed GRINCH detector, DAQ system, and analysis software that is ready for installation in Jan-2020
  - Complete data analysis for first SBS experiment
  - Remain experts and maintain detector for entire SBS program

• **Status:**
  - Todd Averett-primary focus, on sabbatical 2019-20, looking for support to remain at Jefferson Lab
  - 50% of FTE postdoc
  - 1 graduate student, summer 2019, begin thesis full time summer 2020

• **Remaining Tasks:**
  - Construction and cosmic testing of full DAQ
  - Development of online and offline software
  - Investigate possibility of using GRINCH for PID trigger
Detailed Timeline

• 15-Oct-2018 First cosmic data using full DAQ

• 15-Jan-2019 Major cosmic tests completed, assuming no delays:
  • Above will be interrupted and delayed depending on movement of BigBite detector stack to new location and movement and integration of electronics into BigBite weldment, estimate 2 months?

• 15-May-2019 Completion of software development

• 15-Aug-2019 Development of PID trigger complete