

ANL in ATLAS: Wrap-up



2009-2012:

3 years ago the challenge facing the ANL ATLAS Group was the transition from construction to operations and physics analysis.

The plan for this period was:

- Insure the effective operation of the detector systems for which we have “ownership”
- Contribute to several standard model physics analyses
- Look for signals of physics beyond the Standard Model
- Make the Argonne Analysis Support Center a major factor in enabling US physicists to contribute to physics at the LHC – attracting both faculty and students to work with us and with each other
- Establish appropriate and important roles in ATLAS Phase 1 and Phase 2 Upgrades



2009-2012: The Outcome

Research program:

Underpinned by Calorimeter performance – Jets and missing transverse energy

- > underlying event measurements using tracks and calorimeter energy clusters
- > Calorimeter energy clusters in measurement of jet shapes (QCD test)
- > SM tests of $W + \text{jets}$, $\gamma + \text{jets}$, $Z(\nu\nu)\gamma$
- > Calorimeter clusters in variables used to study decays of boosted objects
- > tri-lepton analysis as a signature for SUSY
- > di-lepton analysis for Higgs- $\rightarrow WW^*$, di-photon for $H\rightarrow\gamma\gamma$
- > Jets and E_{tMiss} in searches for “compressed SUSY”

Analysis Support Center:

- > ~15 long-term visitors at any time. (22 total, 33 including undergrad interns)
- > Physics oriented. Strong collaboration with university groups
- > Many analysis teams at ANL ASC, physics papers and internal notes

R&D for detector upgrades:

- > established important roles in Phase 1 (FTK)
- > performed important preparatory work for Phase 2 upgrade R&D
- > identified and began initial work on opportunities in software and computing



2012-2015

The next 3 years will bring exciting physics opportunities, more data-taking as well as a 2 year shutdown during which the machine will be readied for operation at 14 TeV (well maybe $\sim 13\text{TeV}$).

The foundation for this research program has been established through the work done in 2009-11 and the expertise and leadership gained in this period

The plan is:

- Study the properties of the Higgs-like boson (spin, decay rates to b 's, τ 's, $Z\gamma$, $\gamma\gamma$ etc.)
- Look for signals of physics beyond the Standard Model (SUSY, Boosted tops)
- Extend Standard Model physics studies
- The Argonne Analysis Support Center will provide a focus for analysis efforts and hardware activities for students during the long shutdown
- Complete construction, installation and commissioning of replacement LVPS for the tile calorimeter
- Continue R&D in support of Phase 1 and Phase 2 upgrades (FTK, Tile Demonstrator)
- Contribute to re-commissioning of ATLAS and preparing for 14 TeV data

A key challenge will be to retain the necessary manpower and expertise to carry out this program

