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PRINCIPAL LHCC DELIBERATIONS

31ST MEETING OF THE ATLAS RESOURCES REVIEW BOARD

11 OCTOBER 2010

EMMANUEL TSESMELIS

SCIENTIFIC SECRETARY, LHCC

GENERAL

This document summarizes the principal LHCC deliberations concerning ATLAS at the Committee's sessions in May, July and September 2010.

The LHCC considers that ATLAS has made excellent progress in all aspects of the experiment and the Committee congratulates the ATLAS Collaboration on its achievements.

CONCERNS FROM THE PREVIOUS ATLAS RESOURCES REVIEW BOARD

SUB-SYSTEM	CONCERN	STATUS
Cathode Strip Chambers	Rate capability of the read-out modules of the Cathode Strip Chambers (CSCs).	The CSCs are currently capable of being read out at 66 kHz with negligible dead-time, a rate which has increased in the past months.
LAr Electromagnetic Calorimeter	Failure of front-end optical transmitters of the LAr Electromagnetic Calorimeter.	ATLAS plans to access one side of the detector and replace all of the broken links that are accessible during the 9-week 2010-2011 technical stop.
Inner Detector Cooling System	Reduced operational efficiency.	ATLAS plans to replace the evaporative cooling system in 2012 with a hybrid system that is both gravity-fed as well as having pumping capability built in.

STATUS OF THE EXPERIMENT

DETECTOR

The ATLAS detector is performing exceptionally well, collecting data with 95% efficiency. The trigger continues to successfully adapt to the changing beam conditions and collecting its physics data sample with minimum dead-time. The specification for the ATLAS trigger is to provide the DAQ system with 200 Hz of data. The trigger is sufficiently powerful and flexible that as of late, the ATLAS team has gone well above the 200 Hz limit to maximize both its physics and its ability to monitor detector/trigger performance without violating the computing model.

The LHCC highlighted the following issues:

- Cathode Strip Chamber (CSC) trigger/readout – The CSC is currently capable of being read out at 66 kHz with negligible dead-time, which has increased in the past months. During high rate trigger tests using “simulated triggers”, a problem was identified in processing the 3rd trigger decision. This problem has not presented itself during normal data taking operations. This problem has been corrected and is no longer an issue.
- Semiconductor Tracker (SCT) and Pixel Optical Links – These links transfer clock and command information to the detector. There are 632 links in total. This hardware has been stable for the past year or so, but in the few weeks prior to the July 2010 LHCC session, 40 links had failed hard. These devices are located off-detector so they can be replaced on short detector accesses. Since then another 60 or so have failed on both the SCT and Pixel detectors. The reason for the mortality is still under investigation. ATLAS Management is aggressively pursuing this problem and has established a task force to address what corrective action is needed.
- Inner Detector Cooling – ATLAS plans to replace the evaporative cooling system in 2012 with a hybrid system that is both gravity-fed as well as having pumping capability built in. The LHCC recommended to the Resources Review Board Scrutiny Group that the latter body approves this expense on the Maintenance and Operation (M&O) costs.
- LAr Calorimeter OTX Optical Links –The plan will be to access one side of the detector and replace all of the broken links that are accessible during the 9-week 2010-2011 technical stop. An 11-week technical stop would be required in order to fix both sides.

The LHCC covered a number of other issues in the sessions as well. They include:

- Solenoid Cryogenics – air dryer was installed in July 2010 and the cryogenic systems have been stable and functioning well ever since.
- LAr Calorimeter and Tile Calorimeter Power Supplies – plan is being executed.
- Beampipe upgrade - progressing as planned, no issues with the pipe, flanges or aluminium ion pumps.
- Hadron Calorimeter noise bursts - monitoring ongoing, made some dedicated studies with runs taken with high voltage off or at intermediate values. It does not seem to scale with the luminosity. Exact cause not yet known, but most likely charges trapped in the electrodes which discharge with time.
- Control room shifts – working well. Plan is to revise control room shift operations with the goal of a significant reduction in the number of people needed to collect data at the end of the 2010 run.

PHYSICS

ATLAS has had an outstanding summer conference season in which they presented a large number of results using the full data set of up to 3 pb⁻¹. They have already achieved sensitivity that in select channels either competes with or surpasses the Tevatron programme. Equally important, they have made significant progress in understanding their physics objects like jet energy scale, muon and electron identification, and b-tagging that will position them well for future success. While further

improvements will no doubt be made, the maturity of the physics analyses is impressive given the short period of time the Collaboration has had access to the data.

To date, ATLAS has made 93 physics results public in 2010 with 3 papers published and another 3 expected to be submitted in the coming week. ATLAS submitted over 30 abstracts to the 2010 International Conference on High Energy Physics (ICHEP) in Paris and over 1000 collaborators are successfully submitting analysis jobs to the World-wide LHC Computing Grid (W-LCG) demonstrating the enthusiasm and commitment the Collaboration is making to its physics programme. One billion Monte Carlo events with full simulation were produced this year alone on the W-LCG. The offline systems and W-LCG computing architecture is performing well; the data is processed in a very timely manner and made available to the analysis teams.

HEAVY-ION RUN

ATLAS is prepared for the upcoming heavy-ion running. This programme is an important part of the Collaborations overall physics goal and is an integral part of their physics programme. The entire Collaboration is expected to share in the load of shifts, detector operations and maintenance.

2010-2011 TECHNICAL STOP

ATLAS currently has a plan in place to open up one side of its detector and do a series of maintenance and repair work in the 9 available weeks during the 2010-2011 technical stop. ATLAS has other work it could accomplish but does not want to drive the length of the upcoming stop. However, if it had advanced knowledge that the shutdown would be lengthened – it would make effective use of the available time.

ATLAS UPGRADE

The draft Technical Design Report for the ATLAS Insertable B-Layer (IBL) has been submitted to the LHCC for review. The Committee is currently reviewing the IBL Technical Design Report and encourages the ATLAS Collaboration to further their studies and continue developing their experimental design. The LHCC will discuss extensively the ATLAS upgrade plans with a recommendation expected in the upcoming sessions of the Committee and also encourages preliminary discussions with the funding agencies on possible commitments to be addressed in detail at the April 2011 session of the Resources Review Boards.