UCG Report on the ATLAS Phase II Upgrades

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Preamble: As the CMS and ATLAS Phase II upgrades evolve from conceptual to final designs toward production of TDR's, it is important for the experiments, LHCC and UCG to recognize the following:

- As stated in the Step 1 approval from the RRB, the experiments are to design to "**a scale of funding** between the full funding and the intermediate scenario." It is especially important to keep this in mind for the tracker TDR's, as they are high-cost, and are likely to be the first to be submitted.
- Where major risks exist, fallback positions should be developed if possible.
- Authoritative technical evaluations of the TDR's are essential, and to accomplish this the LHCC and UCG will need to be augmented with additional expertise. As the best expertise likely resides in ATLAS and CMS it would be very helpful if the experiments and committees could work together to find a way for experts from one of the experiments to contribute their comments and advice to the other experiment. We welcome suggestions from the experiments!

Observations:

First, we thank the ATLAS collaboration for their detailed and thoughtful response to our recommendations from September 2015. For the major upgrade projects (ITk, TDAQ, Muons, Lar) ATLAS is organizing initial design reviews to be completed by June 2016. Six TDRs (ITk is submitting two) will be submitted between the end of 2016 and December 2017 and good progress is underway to meet this milestone. Simulation studies to assess the final detector performance are ongoing, within the limitation of computing time. A few important decisions fixing major parameters still have to be taken during the coming year. Options for the forward calorimeter upgrade are being evaluated, with decisions to be made during the next few months. We look forward to a report in September.

Comments:

We were pleased to see the good progress towards the two TDRs for the ITk, which is the major project of the upgrade program.
We take note of the need to detail the process between the TDR approval and the actual placement of contracts to ensure proper oversight while preventing any delay.
Some concerns were expressed concerning the activation of the region of the sFCAL and the reliability of the existing models and extrapolation at HL-LHC.
The Oct 3-6 ECFA workshop is an important opportunity for the LHC community to provide input.
We have concern that the problems with the NSW could affect the phase-II muon upgrade.
TDR's should be submitted only when they are mature, and when risks are understood at an acceptable level.

- The instructions for submitting information for the Upgrade Cost Group, developed during the Phase-1 process, have been updated and should be used as a guideline.
- We expect a self-contained description of the physics performance of the actual detector, using the most recent simulation available
- ATLAS should provide a summary of any differences in the parameters and performance between the actual detector and the Scoping Document detector.

Recommendations:

1. A fixed set of milestones should be produced for the preparation of each TDR, and then tracked throughout the project.
2. Priority should be given to the work on the forward calorimeter options to reach a decision (and cost estimate) as soon as possible.
3. ATLAS should produce a plan for accomplishing the phase-I and phase-II muon upgrades within schedule.
4. Cost estimates for each subsystem should be updated regularly, so that the overall cost of the project remains understood as TDRs are submitted.