ATLAS PIXEL SYSTEM ISSUES AND CONCLUSION

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Major Technical Issues Now

- Front-end electronics is critical path item
  - Can all requirements be met for system, differences for B-layer
  - 25 Mrad or more functionality
  - Maintain two vendors
- Module performance
  - System stability and noise immunity
  - Integration of optical and power connections
  - Need much more experience to understand yield for all module components and assembly
- Reliability of cooling/mechanical system
  - Integration - does it fit together reliably?
  - System-level prototypes expensive and require coherent program across entire system, not just U.S.
- We believe our development program addresses these issues but your specific advice/comments are needed.

Non-Technical Issues

- Costs
  - As we learn more about yield of all steps needed to produce working, reliable modules, costs will likely increase
  - Scope of mechanical prototypes also rising
  - U.S. ATLAS will do cost-to-complete by early 2000, well before we had planned our baseline review
  - Should we advance our schedule to be able to have complete pixel cost estimate in time for U.S. ATLAS cost-to-complete deadline => baseline review in early 2000? Clearly the pixel contingency will be higher for earlier estimate.
- B-layer
  - The B-layer components(electronics, sensors, mechanics) will very likely be different than the rest of the system and decisions on these will come later than for rest of system.
  - The U.S. groups may be in a position to make unique contributions(eg. in sensors(diamond) or electronics(higher density Honeywell) or mechanics)
  - Should the U.S. contributions to the B-layer be part of the baseline in 2000? Is separate budget request remotely feasible?

More Non-Technical Issues

- Integration engineering manpower
  - So far we have taken the lead on this for mechanical items in recognition of the need and because we have the skilled personnel
  - We will continue at some level, but the need for integration manpower will grow and should also include electronics/electrical issues for which the U.S. currently has the leadership.
  - To date all engineering personnel from collaborating institutions are supported by non-project funds and we would like to keep it this way. But this is likely to be impossible if we expand our integration/systems role now(and it’s needed now).
  - In addition, conflict with support of the critical path item is a strong possibility at some time.
  - On the other hand, overall schedule delays likely if collaboration doesn’t devote more people to integration.
  - Should we increase our role in systems integration? 1 FTE of added engineering would be required.

Conclusions

- We hope that you are convinced that very substantial progress has been made to develop the pixel concept for ATLAS.
- It appears that the "proof-of-principle" phase is largely behind us except for a complete demonstration of the critical viability (of the electronics and modules) after 25 Mrad.
- It's recognized that we have a lot of work to do to go from a few successful prototypes into a production mode starting (for some components) in 2000.
- But we believe our program of work over the next year and more is well formulated to meet this goal.