DCCT/Toroids Meeting

2/1/2012

DCCT

1. Will be used in the Delivery Ring for Mu2e operations but not for g-2.
2. Minimum costing assumes that all filtering with the current Debuncher DCCT is ok.  Very minimal cost and labor.
3. Most likely costing keeps the same hardware and makes some kluge changes to the existing DCCT front end and electronics upstairs.  This assumes that all of the filtering is ok (doesn't need to be slower or faster).   Scaling changes can be made upstairs.  Baseline subtraction is currently used for the Debuncher DCCT and will be removed.
4. Both Minimum and Most Likely costing estimates have use reuse the tunnel hardware.  There are components that are obsolete and can not longer be purchased.  We can consider this a risk.  However, there are three spares (Accumulator DCCT, Tevatron DCCT and spare DCCT).
5. Maximum costing assumes that we replace  with a completely new DCCT system.  The first installation of this style of DCCT is expected in the RR by 2013.  This style takes all of the analog electronics and puts them into a digital front end.  This provides more flexibility if problems arise with measuring the beam with the old DCCT system.

 Toroids

1. g-2 operations
   1. Costing assumes that we can only use toroids up to the up through the M1 line (more on low intensity options later).
   2. Minimal costing assumes that we use existing toroids and insulators, stay with only one toroid in the P2 line, and only require general maintenance on the toroids.
      1. The major cost in both cost and labor is migrating form existing NIM crates to the VME platform.  VME crates are repurposed from other locations..
      2. **Aisha will provide a second minimum costing estimate that has us stick with the NIM electronics.** 
         1. In this scenario, we would plan on migrating to the VME front end at a later time.
         2. The risk is there are currently no spares; however, when MI and RR systems are upgraded the old NIM crates will become the spare pool.
         3. If we stick with the NIM crates, the readouts will need to be rescaled.
         4. Disadvantage of the current system is the maximum update rate is 15Hz.
      3. Going the the VME front ends right away saves us money in the long run because the new digitizer boards are repurposed and almost free, so most of the cost is moving to the VME platform.
   3. The Most Likely scenarios add the additional cost of designing and procuring a new transition board for analog conditioning.  Again, we move to the VME crates, but they are repurposed from other locations.  The most likely scenario is broken into three tears of costing.  The first assumes that we do not add a second toroid to P2 line.  The second assumes we repurpose a second toroid for the P2 line and the last estimate assumes what we purchase a new toroid for the P2 line.
      1. If we could live with PREAMPS in the tunnel, the cost of the transition boards would go away, making for significant cost savings.
   4. The maximum scenario assumes that we reuse existing toroids and insulators, but fit them to the Instrumentation standard stand and network.  All would be upgraded from the output of the toroid downstairs and upstairs.
2. Mu2e operations
   1. Tor109 will be left in pace for g-2 operations.   Instrumentation was planning on later moving Tor109 for Mu2e operations, so if there is need to switch back and forth between Mu2e and g-2, we would need to leave Tor109 in place.
   2. Assumes all Toroid up to AP0 was completed for g-2 operations.   Maintenance will be performed on all of these Toroids.
   3. If a second P2 toroid is needed, and if this was not completed in the g-2 scenario, then there will be additional cost.
   4. Currently the the 733 toroid (3" aperture) is used for the abort line.
      1. We need to decide if we want to use the 11" large aperture 724 toroid for the abort line (either in addition or instead of 733).
      2. Instrumentation also has 6" aperture toroids that they have implemented in Linac.
      3. Brian will discuss this with other beam team members.
   5. Minimum costing assumes that we did not add a second toroid to the M3 line.   The major cost is implementing the repurposed VME front ends.
      1. **Aisha will provide a second minimum costing estimate that has us stick with the NIM electronics.**
   6. Most likely costs again use the repurposed VME crates with new analog conditioning boards.  Again, we have three tiers of most likely costing depending on if we do not add a second M3 toroid, repurpose another toroid for M3 or purchase a new toroid for M3.
3. Measuring low intensity secondary beam for g-2 operations:
   * 1. Scope-based toroids
        + 1. Dave Peterson outlined how the AP2 scope-based toroids work.
          2. A test was done today moving D/A electronics over to Tor704.
          3. A good signal was seen with the equivalent of what we would expect to see on 2e9.  We know we will be able to see the equivalent of D/A line stacking beam (2e8).  It is not sure if we will be able to see 1E7 beam yet.  We will make an attempt to determine this in planned beam studies.
          4. This system uses a 4 channel scope, which can be purchased for ~$4K.
          5. Instrumentation prefers to use a digitizer instead of the scope.
          6. Dave Peterson will do a cost (M&S $, plus labor hours) estimate on how much this would cost per toroid.  We may already have much of the hardware available in our spares pool.
     2. Wall Current Monitor
        1. The WCM has an advantage over the toroid in that is more efficient than a toroid...and much faster.
        2. One could be designed that is current sensitive instead of the broadband sensitive ones designed in the past.
        3. Cost is believed to be $8K - $10K per WCM plus labor.
        4. It is believed that Peter Prieto has already done costing on this.
        5. Brian will check with Peter for costing information and if it is expected that the WCMs will be able to see the 1E7 beam expected in g-2 operations.