



# Towards the TDR: Muon System

- Mechanical
- Readout Electronics (see talk by Will Johns)
- Final Design Studies

## Two Main Issues:

- 1) *We will have a working design by the time of the proposal. Whether or not we have a “production” design is still not clear.*
- 2) *Our **biggest** need for FNAL assistance will be with proper documentation: drawings, specifications, etc.*





# Explanation of Symbols

- I will use symbols to indicate responsible institutions and status of items in our "To Do List" for the TDR.

- Responsible Institutions:



Illinois



Puerto Rico



Vanderbilt



All three of the above



To be decided...



If Requesting FNAL Help

- Status of To Do Items:



Excellent. Nearly complete or certainly will be



Significant work needed, but we have a plan



Problems. No plan (yet), funding, other...



# New Plank(s)

- We believe we have a nearly final “mechanical” design for the planks.
  - Some tweaks will likely be necessary
  - New crimp tool/method appears to work fine for central 24 wires
  - Need to prove we can crimp outer 8 wires
  - Longevity tests needed! (do crimps hold for long periods of time).





# TDR: To Do List

- Verify Robustness of Plank Design



- Crimp Lifetime

- Test plank(s): Measure wire tensions several times over extended period
- Need wire tension measuring station (see below)
- Tests will begin next month on test plank #1, which has been strung and is ready to go. We will re-measure every week.



- Rate studies

- Need beam test. Unlikely to occur prior to Fermilab test beam run next winter.
- Were supposed to do in Vancouver beam test this summer. Necessary NSF funding did not come through in time.



- Exposure/long term rate effects

- Are we using any materials (solders, glues, plastics,...) that behave badly after significant exposure? (see D0 experience)
- Put a plank or two in Tevatron, test in cosmic ray test stand before/after?



# ...TDR: To Do List

- Test Stands (does not include electronics specific test stands)



- Tension Measurement

- Initial design demonstrated to work. Assembly of first stand in progress, tweaks expected.



- Cosmic Ray Test Stand

- Cosmic Ray Tests: Summer & Fall 2001



- Tests:



(if \$\$\$)

- Gas Studies: study D0 gas ("fast"), standard gas (80/20 Ar/C02)
- Efficiency vs. HV
- Doubles/Singles rate (picket fence active area)
- Timing/speed
- S/N: both in pulse height and rates
- Other properties (angle of incidence, distance of hit from electronics,...)



- Need to build several planks --- but no money to do so.

- Different lengths, incremental tweaks to design,...
- Distribute to UPR and Illinois



# ...TDR: To Do List

## • Production Tools

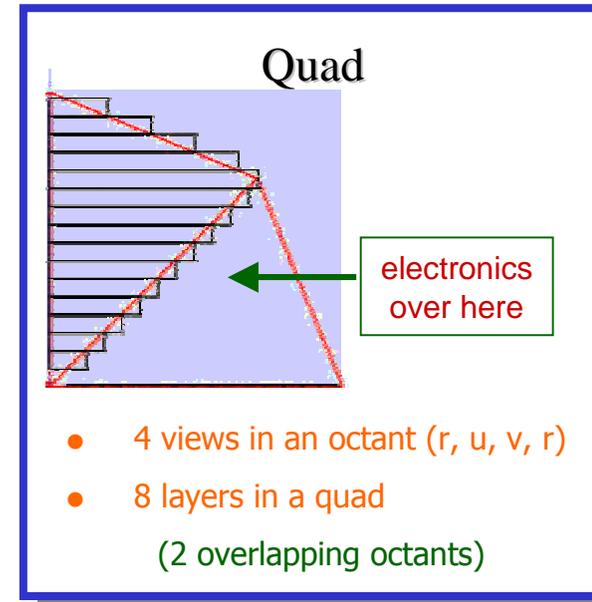
- ↑ **I** • Soldering Jig (solder tubes, together with manifolds, into planks)
  - Initial design, tests needed?
- ? • Stringing Jig
  - Includes continuity test stand and HV test stand
  - These items are costly (money and manpower)
  - Will only do prior to TDR if time and manpower permits

## • Plank Documentation/Final Design

- ? • Drawings and other "official" documentation?

## • Octant/Quadrant Mechanical Design

- ↑ **I** • Scale model (test of design)
  - Illinois making good progress
- ? • Plumbing Issues
  - HV, LV, gas, cable routing,...
- ? • Drawings and other "official" documentation?





# TDR: To Do List

- Mechanical Support, ...

-  →  • Support for Detector Stations
-  →  • Gas Monitor
-  →  • Gas System
-  →  • Drawings, official documentation, ...

- Beam Test

- Rate Studies
- Aging?
- Efficiency studies
- Noise
- "Operation Experience"
- Need beam. Unlikely to get in time for TDR.
  - Canceling this summers beam test --- no funds.



# TDR: To Do List

- Finalizing Overall Design (Monte Carlo Studies)

- Optimize design



- Muon System in BTeV MC

- Update geometry (write reconstruction code?)



- Shielding & Background Studies

- "back shielding in tunnel?"
    - Fill in space between 2<sup>nd</sup> and 3<sup>rd</sup> stations?



- Efficiency for important/example modes

- Trigger and Offline
    - $J/\psi$ , semileptonic, rare modes...



- Trigger Rejection

- Based on "realistic" simulation of trigger...
    - As ramp up random noise, extra min-bias, beam backgrounds!!!!

- Production Studies



- String planks at all institutions using preliminary production tools



- Build a "Quad", test it in a beam? Or with a source, or cosmic rays?

- No time (prior to TDR), no money



# Towards the TDR: Muon System

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