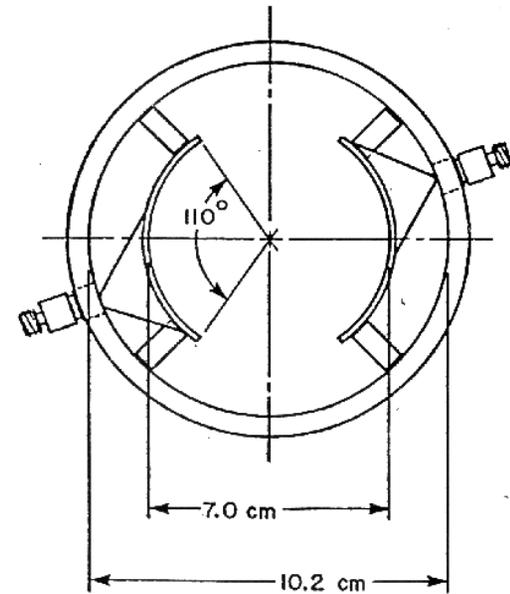


# Tevatron BPM Upgrade

Stephen Wolbers

October 24, 2003

Tevatron Department Meeting



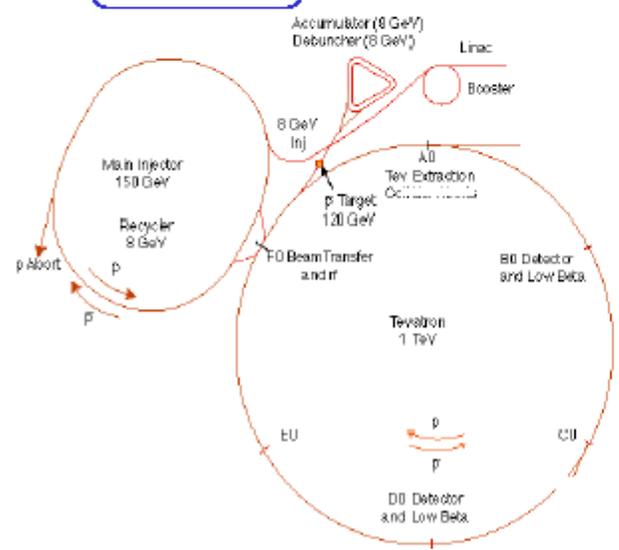
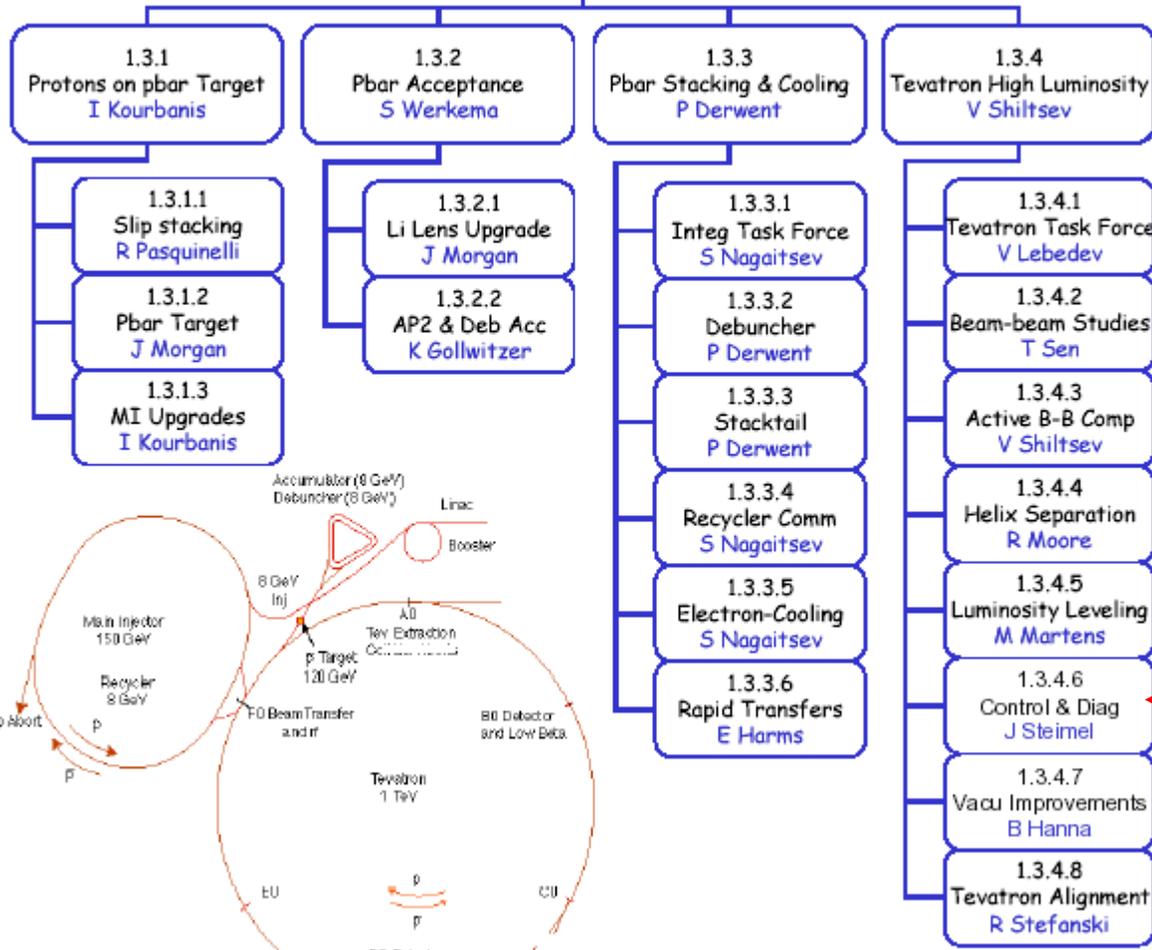
# Project Definition

- The Tevatron BPM Upgrade Project will replace the current BPM electronics and the data acquisition system used to transfer information between the BPMs and the Accelerator Controls Systems. As part of the project, the software used to read out, transfer, store, and analyze the BPM data will be upgraded. The goal of the project is to provide a BPM system based on modern hardware and software that gives the higher resolution and expanded functionality necessary to efficiently understand and operate the Tevatron Collider now and for the foreseeable future. Deliverables of the project include all relevant documentation, manuals, users guides and any other written records necessary for maintaining the system.

The project includes replacing the Tevatron BLM system interface hardware and software that is tightly coupled to the BPM system.

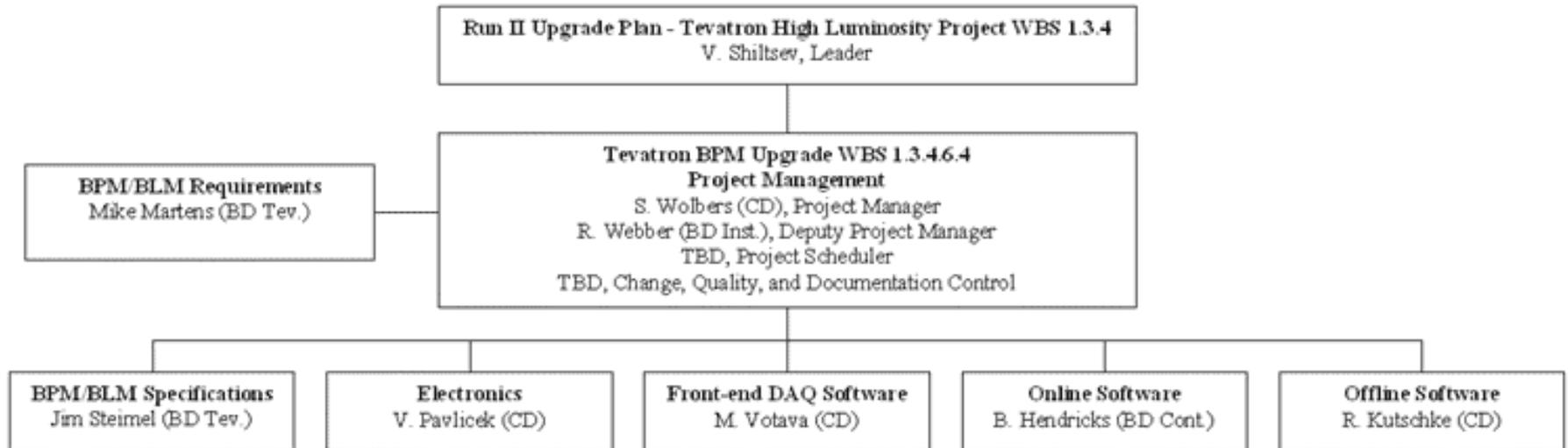
# Luminosity Upgrade Organization

1.3  
Luminosity Upgrades  
J. Spalding Prj Mgr  
D McGinnis Tech Coord



**We are here** →

# Project Organization



# Integration/Interaction with the Tevatron Department

- The Tevatron BPM Upgrade makes no sense if the Tevatron Department is not involved.
  - Currently we have Jim Steimel and Mike Martens ably representing the Tevatron Department and its needs.
  - All information - minutes of meetings, documents, talks, emails - are on the web and accessible.  
[wwwserver2.fnal.gov/tevbpm](http://wwwserver2.fnal.gov/tevbpm)
  - All documents go into the Beams Division Documents DB.
  - Anyone can subscribe to the mailing list:
    - [Teв-bpm-project@fnal.gov](mailto:Teв-bpm-project@fnal.gov)
    - (Send mail to [listserv@fnal.gov](mailto:listserv@fnal.gov) with a blank subject and one line in the text "subscribe tev-bpm-project  
*First name Last name*"

## CD Contributions

- The Computing Division is a partner in the project and the effort will ramp-up as required.
- CD is committed to the project (see next slide).
- Effort so far (captured from CD effort reports):
  - 2.3 FTE in August
  - 4.1 FTE in September
  - Will ramp up during the coming months

# Demands on the \$3M

|  |  | \$K  |             |  |
|--|--|------|-------------|--|
|  | Excess Income over FY03  | =    | <b>3155</b> |  |
| 1  | Salary increments for 269.2 FTEs flat  | 1676 |             |  |
| 2  | Buy more stuff for CMS   | 570  |             |  |
| 3  | Send more money to universities and elsewhere for CMS                                | 300  |             |  |
|  |  | 2546 |             |  |
|  | Remains  |      | <b>609</b>  |  |
|  | 4 Support #1 priority of lab - help TeVatron & Beams                                 | 1700 |             | 17 FTEs (was 8.5 in FY03)                |
|  | 4.1 Startup of more organized modeling activity ?                                    | 130  |             | 1.3 FTE                                  |
|  | 5 Computing for MINOS and networking   | 200  |             |  |
|  | 6 Support BTeV (more than in FY03?)  |      |             |  |
|  | 6.1 Must replace an engineer who left to do this                                     | 100  |             | 1 FTE                                    |
|  | 7 Deal with our Building Issues (addit. Costs for CD)                                | 300  |             |  |
|  | 8 Support for Run II - NO ramp down in effort here                                   |      |             |  |
|  | 8.1 Data handling and movement systems still an issue                                | 200  |             | 1 FTE                                    |
|  | 8.2 Code efficiency and infrastructure -> costs for us                               | 100  |             | 1 FTE                                    |
|  | 9 SNAP have requests for extra help (not in budget)                                  | 150  |             | 1.5 FTE                                  |
|  | 10 Networking - Fiber to Starlight (NASTY SURPRISE)                                  | 400  |             | HELP NEEDED HERE                         |
|  | 11 GRID - strategic direction, must be involved and lead (depend on to reduce costs) | 200  |             | 1 FTE                                    |
|  | 11.1 Security events, infrastructure and reporting                                   | 100  |             | 1 FTE                                    |
|  | 11 System admin, central virus, backups etc.   | 250  |             | 1 FTE + tools                            |
|  | 12 Increased Computer Security burden  |      |             |  |
|  | 13 Increased Services burden all round (others short of money)                       | 200  |             | 2 FTE                                    |
|  | 14 Increased Network work - Strategic - ESNet going?                                 | 100  |             | 1 FTE                                    |
|  |  |      | <b>4130</b> |  |
|  | 15 Desperate demand throughout CD for new blood                                      | ?    |             |  |
|  | Remove "charge" for Beams work   |      | <b>2430</b> |  |
|  |  |      |             | <b>OVER BUDGET IF WE DO THESE THINGS</b> |

(From 10/20/03 CD Budget Review)

# Project Status

- Requirements written and reviewed
  - Version 3.0 released September 8, 2004.
    - Primarily the work of Mike Martens and Jim Steimel and others in the Tevatron Department
  - Review completed and released September 24, 2003.
- Specifications are being written.
  - Work of Jim Steimel.
  - Outline and a few sections are either complete or are in advanced stage of writing.
    - Beams Doc DB #836,#837,#872
- Tunnel work during the shutdown
  - The tunnel work included measuring the BPM offsets and preparing (but not connecting) the cables for the pbar signals.
  - Thanks to everyone who helped.

# Electronics/Design

- Spent first 2 months "getting up to speed"
  - Long series of lectures and discussions organized by Jim Steimel
  - Tremendous amount of vacation in August and September slowed up much of the work.
- Concentrated efforts are underway to select appropriate core BPM signal processing hardware; at least two options remain open
- A large amount of beam data was recorded prior to the shutdown to allow off-line development and evaluation of signal processing techniques to proceed while the Tevatron is down

# Options for core signal processing

- A. Cost /channel
- B. Can satisfy Tev BPM requirements
- C. Suitable for MI and Transfer Line BPM
- D. Time to build/procure
- E. Has additional abilities, possible future upgrades
- F. Readout speed adequate
- G. Time and Effort for development

|                 | A.      | B.    | C.  | D.     | E.  | F.    | G.          |
|-----------------|---------|-------|-----|--------|-----|-------|-------------|
| 1. Echotek      | \$1000  | Maybe | No  | Quick  | No  | Maybe | Little      |
| 2. Echotek mod. | \$1500? | Yes   | Yes | Longer | Yes | Yes   | Moderate    |
| 3. Damper       | \$ 500  | Yes   | Yes | Longer | Yes | Yes   | Substantial |
| 4. Commercial   | \$2000  | Yes   | Yes | Quick? | Yes | Yes   | Substantial |
| 5. Chase Board  | ?       | Maybe | ?   | Longer | ?   | ?     | ?           |
| 6. Other        | ?       | ?     | ?   | ?      | ?   |       |             |

# A note on M&S Costs

- No baseline cost has been established yet.
- Original estimate was based on 480 channels of electronics (2 per BPM) + infrastructure, calibration, test, etc.
  - \$900K + 60% contingency
- A budget estimate was made in early October.
  - Twice as many channels (960)
    - p and pbar ends read out.
  - Upper range of electronics cost estimate
    - \$2.223M (includes test and calibration circuitry, test stands, prototypes, VME crates, front-ends, etc.)
    - + effort
  - This will be refined and updated as we :
    - Make the choice of electronics
    - Learn the fabrication/acquisition costs
    - Get quotes on other parts of the hardware and software development components.

# Software

- Front end/DAQ/online
  - Data format definition is in progress.
    - BD Doc #860
  - Test stand activity/BLM work
- Offline
  - Identified all BPM/BLM applications
    - BD Docs #823,#824,#825
  - "Training" on a BPM-related project
    - Rob Kutschke & Valeri Lebedev

## Plans (dates are estimates)

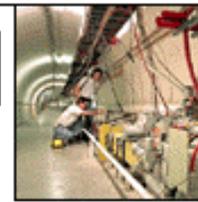
- Make electronics choice and design, get it reviewed
  - December, 2003
- Fully establish software sub-projects.
  - December, 2003
- Prototype, procure, install, commission.
  - December-summer, 2004.
- Push ahead on all fronts in parallel.
- In general, ramp up efforts all around.

# Operations/support

- We will need a plan to move from the current Tevatron BPM system to the new one.
  - Options include partial integration in parallel, complete switch-over, phased installation.
  - Not much thought has gone into this yet.
- This system, once finished, will require proper hardware and software support.
- This support is not part of the project but is critical to the long-term success of the system.
- This must not be forgotten as we move forward to system delivery and integration.

# Summary

- Tev BPM upgrade is up and running:
  - Web pages:  
([wwwserver2.fnal.gov/tevbpm](http://wwwserver2.fnal.gov/tevbpm))
  - Mailing list: [tev-bpm-project@fnal.gov](mailto:tev-bpm-project@fnal.gov)
  - wbs
- Plan is to work as hard and fast as possible to produce a working system, complete with diagnostics, calibration, software, applications, schematics, designs, drawings, documentation.

[Fermi Home](#)[BD Home](#)[CD Home](#)[Project Home](#)[Meetings](#)[WBS](#)[Documents](#)[Presentations](#)[Organization](#)[Mailing Lists](#)

## Tevatron BPM and BLM Upgrade Project

- ◆ [Organization](#)
- ◆ [Meetings](#)
- ◆ [Reviews](#)
- ◆ [Documents](#)
- ◆ [Presentations](#)
- ◆ [WBS](#)
- ◆ [Mailing Lists](#)



# Summary

- Requirements have been completed and reviewed !
- Tunnel cabling work to access pbar signals is underway during this shutdown
- Systems design issues including details of built-in calibration circuitry are yet to be addressed; loosely coupled with with core hardware selection
- Strategy, schedule, and cost planning and estimating is still in infancy stages as project personnel are still in mostly in learning stage
- BLM system data acquisition system that will be updated with BPM system is at stage where real implementation decisions and activity is ready to begin; personnel are on-board awaiting assignments