The TeV IPM utilizes micro-channel plates to amplify the ionization signal produced by the beam.

- Residual gas impact
- 128 Anode strips
- Front-end readout
  - QIE board
    - 6U card
    - 8 ch 14 bit ADC
      - Min signal 1 fC
    - 35 MHz
    - Data serialized
      - Sent by Fiber
      - 1.6 Gbps
  - Buffer/Collector Card
    - PCI bus based
    - 12 fiber ch input
      - 12X8 ch - 96

Buffer/Collector Card:
- 16 serial links (optical fiber)
  - ~1.6 Gb/s/link
  - ~23 Gb/s total
- 16 ch - 12288 bytes
- 10X optical driver
- 16X8 ch - 96

Sidebar:
- Injection event
- Commands:
  - Start/stop DAQ
  - Readout data
- PCI bus
- DMA xfer
- Burst mode
- Readout data
- Min signal 1 fC
- 35 MHz
- Data serialized
- Sent by Fiber
- 1.6 Gbps
- 12 fiber ch input
- 12X8 ch - 96
- 16 serial links (optical fiber)
  - ~1.6 Gb/s/link
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Fermilab Tevatron IPM Electronics
Front-End Card

8 QIE Chips
Buffer Card

12 fiber inputs
Buffer Card Block Diagram

12 Channel Optical Receiver → Xilinx XC2VP20 FPGA → PLX 9656 PCI Interface

32-bit / 66 MHz

256 MByte DDR SDRAM

256 MByte DDR SDRAM

64-bit / 66 MHz

PCI
TeV IPM Electronics

- We would most likely want to re-layout the boards
  - Change input connector to QIEs
    - Currently flex cable
    - Go to RG 174?
  - Some parts are now obsolete
    - Buffer card
- If we keep with the PCI bus based receiver card
  - Little engineering to get a system that would possible work for MICE
  - To redo the receiver card to put in VME is about 2 mm of engineering
TeV IPM Electronics - Costs

- Front end board
  - About $500 each (approximately $60/ch)
- Buffer card
  - About $3k for 128 channels
- We have been told that there are enough 35 MHz spec QIE (CMS rejects – CMS spec was 40 MHz)
  - No cost
- Engineering at Fermilab is about $15k per month fully loaded
  - Could negotiate with the lab on this
- Even if we decide to use the electronics as is, we will have some engineering costs for making the connector mods and for production supervision
Documentation

• See
  ◦ Tevatron_Ion_Profile_Monitor_2005_12_09.doc
  ◦ IPMBufferHardwareManual110905.doc