Beam Monitoring at Belle

- Where are the sensors
- First results from March 2004
 - Correlations with Belle PIN diodes
 - Output from the Fast amp during beam aborts
- Future plans

William Trischuk Toronto/RD42 May 14, 2004

In collaboration with Aya Igarashi (Tsukuba), Harris Kagan (Ohio State), John Martin, (Toronto), Samo Stanic (Tsukuba), Toru Tsuboyama (KEK) Packaging for Belle



A Finished Belle Monitor Package



Location of Monitors in Belle

• Have attempted to duplicate BaBar setup in Belle



The Installation at Belle



Readout Electronics

- Produced two different circuits to
 - Supply sensor bias
 - Condition signals suitable for
 - * Readout by slow sampling ADC (few Hz)
 - * Fast amp to oscilloscope (50 ns shaping)
- Two copies of each circuit available on one board
- Readout through Belle test DAQ
 - Eventually put this into standard datastream



Amplifiers/Signal Conditioning



Position of Diamond and Silicon PIN Diodes

• Had two Belle Silicon PIN Diodes available for comparison



- Diamond's most sensitive to HER losses (PIN2)
- Currents in diamond are very small
 - Masking at Belle works VERY well

First Beam Abort seen with Slow Amp



Beam Aborts with Fast Amp





- Learned about impedance mismatches
 - 50 Ω for first 4 m
 - 75 Ω (HV) for next 25 m
- Replace 75 Ω cables this summer

Next Steps

- Plan to produce second generation readout electronics
 - Increase gain on slow amplifier
 - Improve impedance matching for fast signals
- Calibrate readout current vs. dose for existing sensors
- Considering deploying additional sensors
 - Outside Belle IP region
- Study long term behaviour of devices