Front-end and DAQ issues in Run IIb

- SVX3 issues
- Deep submicron issues
- DAQ issues

SVX3 radiation hardness. Survivability out to 4 Mrad (Co-60 studies). SEU studies using a 60 MeV p beam at UC Davis last year concluded the same but analog performance degraded (saturation due to beam). Digital functionality remained out to 8 Mrad.

Honeywell SVX3 chip

- Recent quotation exists (i.e. they would make more). No known basis for rumor that they will shut down 6" line this year.
  - 5 wafers @ $24,200 /wafer
  - 40 wafers @ $20,000 /wafer
- Assume 40 wafers and yield of 25%, then the cost per good chip is $600 (D0 has a PO for SVX2 chips @$20)
- Assume we use good+fair die, we expect 900 spare die from SVXII (cost $0). Additional good+fair at $300/chip (assume 50% yield). [New estimate is 400 spare chips (6/14/00)]
- Chips needed for Layer00, Layer 0, and Layer 1 = 828 + spares

SVX3 replacement

If RunIIb requires 8400 chips as RunIIa and $2.5M is not to be spent on additional Honeywell chips, then what are the options?

- Harris rad hard CMOS process
  - estimate 1 yr for translation
  - Hope experience would be better
- A deep submicron replacement seems the most sensible approach, but...
  - Analog needs complete redesign
    - 2.5 V rail voltages
    - transistors need to be resized
    - experience of FPIX1->FPIX2: 1 yr (1.5 FTE) [ATLAS estimate 1+ yrs w/(2-3 FTE)]
    - For new-SVX3, time driven by typical chip development time (2 yrs)
    - A start with CMS APV25-style front end could help shorten development time
  - Digital still needs resizing of transistors

DAQ issues

- Progress with DAQ electronics for LHC experiments
- Field Programmable Gate Arrays improvements
- ASICs
  - GaAs CHFET serializer
  - 0.25 μm serializer
- Optoelectronics
  - Vertical Cavity Surface Emitting Lasers (VCSELs)
  - pin diodes