The APV25 Chip & The STT

- CMS Tracker Readout by APV25
  - Preamp → Shaper → Pipe → Mux
  - 0.25µm → Rad hard to 20 Mrad
  - 128 chan’s x 192 cell pipe
  - deadtimeless mode (<32 L1acc)
  - Mux speed 20 or 40 MHz

- The Basic Readout Chain
  1. 2 APV (preamp, shape, pipe)
     - run at 20 MHz each
  2. 1 APVMux
     - 40 MHz output
  3. 1 Fiber (256 channels)
     - small size Tx, Rx needed
  4. 1 FED Channel (96 chan/FED)
     - digitize, subtr ped, reorder, cluster, sparsify
     - link to DAQ
  5. FEC/CCU (controller)

Warning: I am not an APV expert watch for errors!
DØ Implementation & STT Issues

DØ Modifications to System

- Use unchanged
  - APV & MUX (hybrid?)
  - Optical Xmitter & Fiber
  - CCU
- Remake for DØ
  - APV & optical hybrids?
  - FED / FEC
    * replace VRB / VRBC?
  - Interface to STT
    * FEC output?
  - Interface card(s)
    * temp interlocks, etc.
- APV vs SVX4
  + The chip exists
  - The readout doesn’t

Issues for the STT

- Increased readout time ⇒ longer latency
- APV readout not channel ordered
  - FED reorders / clusters
  - Multi-event buffering of roads on STC & TFC
- SMT input medium changes
  - 4 g-link fibers ⇒ VTM may not be optimal
    * optical Xmit in units of 12 fibers
    * make a new VTM?
Possibilities for speedup

- Run APV at 40 MHz (1 APV / MUX) ⇒ \(~8\ \mu s\) double fiber count

- Run in deadtimeless mode ⇒ \(~7\ \mu s\ (\?)\) add buffering at L1
## Schedule & Cost (my understanding)

| APV       | • Chips finalized now  
|           | • Yield (so far) has been around 84% |
| APV Mux   | • One more iteration ⇒ finalize end of 2000 |
| Optical Tx,Rx | • Commercial components, but few vendors  
|           | • Choose vendor mid 2001 – then build units  
|           | • Note: can test w/out these |
| FED       | • Development through 2002 (?)  
|           | • Some help from RAL possible? for DØ FED devel |
| Cost      | • Total: 2 CHF / channel ⇒ 1 M$ for DØ  
|           |   – 28 CHF / APV  
|           |   – 9 MCHF for optical (50% Tx, 25% Rx)  
|           |   – 7.5 kCHF / FED (96 chan)  
|           |   – includes 10% spares + 10% contingency + test |