FTK monthly meeting

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Status

● Last week, I introduced a stupid bug (in CVS)
  – It worked with single muons, so I committed
  – But with Whbb – there were too many fits!
● Took a while to narrow down
  – Thought problem in am_in() being too slow
  – But: simply missing phi-module information in ss
● All CASTOR patterns are wrong
  – Sectors, constants, slices are good
● Fixed locally, but not in CVS (pending tests)
  – Regenerating pattgen banks (almost done)
● Next page for details
Ss encoding revisited

- We need arrays addressed by “ss”
  - By RAM, ss is limited to ~18 bits, rather than 32
- Attempted hardware-like bit packing:
  - Francesco's idea; avoids module overlaps
  - 7 bits for ieta (module eta, section, is Barrel)
  - 6 bits for module phi location (0..54) – missing
  - 4 bits for phi-location within module (up to 15 ss)
  - 4 bits for eta-location within module (up to 15 ss)
  - MIN TOTAL = 21 bits – too much
- For now, reverted to the old scheme
  - Allows closer packing
    - E.g., 7 bits won't be used for (0..99) range
  - Put in an explicit fix for module overlap
    - Round up #pix / module to multiple of ss width
First plots with phi-eta partition

- This is using pre-bug version of the banks
  - But still includes module overlap problem
  - Only available on tier3
- Each module is divided into 5 equal bins
  - 328/66; 768/154; 144/29
  - Pattgen patterns w/ ~71% coverage
  - Compared to past (328/50, 768/64): larger SCT
- Some plots follow...
50x64, phi-only partitioning

BARREL(1): fits per event(all)
Entries: 250
Mean: 7.166e+04
RMS: 1.687e+05
Underflow: 0
Overflow: 0

BARREL(1): fits per event(miss)
Entries: 250
Mean: 1.341e+05
RMS: 2.733e+05
Underflow: 0
Overflow: 0

BARREL(1): fits per event(maj)
Entries: 250
Mean: 7.165e+05
RMS: 1.687e+06
Underflow: 0
Overflow: 0

66x154, with eta 29

BARREL(1): fits per event(all)
Entries: 250
Mean: 2.903e+05
RMS: 6.012e+05
Underflow: 0
Overflow: 3

BARREL(1): fits per event(miss)
Entries: 250
Mean: 6.756e+05
RMS: 9.841e+05
Underflow: 0
Overflow: 18

BARREL(1): fits per event(maj)
Entries: 250
Mean: 2.18e+06
RMS: 3.799e+06
Underflow: 0
Overflow: 9
50x64, phi-only partitioning

**ENDCAP(1): fits per event(all)**

- Entries: 250
- Mean: 1.32e+05
- RMS: 3.753e+05
- Underflow: 0
- Overflow: 1

**ENDCAP(1): fits per event(miss)**

- Entries: 250
- Mean: 1.876e+05
- RMS: 4.007e+05
- Underflow: 0
- Overflow: 1

**ENDCAP(1): fits per event(maj)**

- Entries: 250
- Mean: 9.913e+05
- RMS: 2.095e+06
- Underflow: 0
- Overflow: 4

66x154, with eta 29

**ENDCAP(1): fits per event(all)**

- Entries: 250
- Mean: 4.764e+05
- RMS: 8.849e+05
- Underflow: 0
- Overflow: 5

**ENDCAP(1): fits per event(miss)**

- Entries: 250
- Mean: 8.848e+05
- RMS: 1.157e+06
- Underflow: 0
- Overflow: 30

**ENDCAP(1): fits per event(maj)**

- Entries: 250
- Mean: 2.79e+06
- RMS: 4.185e+06
- Underflow: 0
- Overflow: 21
<nhit/rd> by layer

Barrel

<nhit/rd> by layer

Endcap
Plans

- If my latest bug fix tests correctly, we should freeze code changes and study some issues:
  - Inefficiency of patterns-from-const patts
    - Once understood, generate large banks
  - Optimization of SS width
    - Verify same # superbins in each layer is best
  - Problems at $10^{34}$ – matching of ftk<->truth
    - Started looking at this (focusing on ftksim_comp)