Constantinos architecture

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(while Constantinos is on vacation)

Architecture summary:
8 SCT hits => SCT trk
1 SCT trk + 3 pix hits => final track
Status

• Fixed the bugs that drop eff at phi boundary
  – New 8L and 4L banks
• Fixed the bug that broke SS partitioning in SCTtrk pseudo-layer
  – Due to assumption: int(float)==floor(float)
• Updated ftk.py to automate the whole process:
  – 8L roads+merge+tracks
  – 4L roadfinder => manufacture “11L”roads
  – 11L roads merge + tracks
Bug in SS partitioning (now fixed)
Settings to maximize efficiency

• Focusing on achieving best efficiency
  - Number of fits is not optimized!

• 8L:
  - Only in-sector roadwarrior
  - No hitwarrior whatsoever
  - Allow 1 missing layer (out of 8)

• 4L:
  - Allow 1 missing layer (not SCTtrk, not B layer)
  - Do not allow 1 missing layer in both PIX & SCT
Bank sizes and coverages

• In all case, BARREL_ONLY pattgen patterns are used
• **8L**: SCT ss=64
  - ~99% sector coverage (7k/region)
  - ~97% pattern coverage (1M/region)
• **4L**: PIX ss=50; SCTtrk ss = several options
  - ~100% sector coverage (3k/region)
  - ~99% pattern coverage (~100k/region)
• **11L** pattgen-only (for comparison):
  - ~96% sector coverage (50k/region)
  - 66% pattern coverage (5M/region)
• **Observation**: it is possible to greatly reduce SS size for 8L/4L case
Color labeling is inconsistent on different pages. Pay attention to the legend!
Independent single muons

Final efficiencies

- 8L: 95.8%
- 8L+4L: 92.8%
- 11L (default): 85.5%
Independent single muons

8L
8L+4L
11L (default)
Independent single muons

- 8L
- 8L+4L
- 11L (default)
Whbb at zero lumi

Final efficiencies (all primary tracks)

- 8L
- 8L+4L
- 11L (default)

- 87% 26k fits
- 77% 48k fits
- 70% 174k fits

All fits, including all 10/11 (both 10/11 roads and majority)
Whbb at zero lumi

- 8L
- 8L+4L
- 11L (default)
Whbb at $10^{34}$ lumi

Final efficiencies (all primary tracks)

- 8L: 90%, 160k fits
- 8L+4L: 77%, 1.1M fits
- 11L (default): 74%, 2M fits

All fits, including all 10/11 (both 10/11 roads and majority)
Whbb at $10^{34}$ lumi
Some observations

- Efficiencies/resolutions look fine (not all are shown in this talk, but we looked at them all)
- Still not clear why we lose so much efficiency from 8L to final 8L+4L tracks
- Gain in # fits is very small once we disable hitwarrior on 8L tracks
  - But we can easily reduce SS widths in 4L/8L
- 8L efficiency is higher for $10^{34}$ than WH @ 0 lumi (higher change to pick up a random hit that works in the fit?)