First results: $\frac{1}{2}$-SS shifted bank

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½ SS-shifted banks

- Top = default bank
- Bottom = ½ SS-shifted bank
- First SS is extra long (to handle edge effect)
- Road condition: $SS1 = SS2 + 1$
- Can only do fits found in both SS1 and SS2
Advantages

- By having two banks, we double patt size
- But, by resolving $\frac{1}{2}$ SS width, $\varepsilon^{11}$ less fits
- Two ways to study this effect:
  - Compare 50x64 -vs- 100x128 with two banks
    - Expect nearly identical efficiency & fewer fits
    - Running now –results next week
  - Compare 50x64 -vs- 50x64 with two banks
    - Expect slightly reduced efficiency
    - A lot fewer fits
    - Results in this talk
50x64 -vs- 50x64 with two banks

• Comparison is on $10^{34}$ Whbb events with:

• [DONE] Sector requirement on roads:
  - For every road in default bank, require a road in $\frac{1}{2}$ shifted bank with the same sector

• [DONE] Superstrip requirement on roads:
  - Only accept roads also found in shifted bank

• [IN PROGRESS] Partial fits
  - Only use hits found in both superstrips
  - Potentially great reduction in # fits
Efficiency (w.r.t IPAT)

The right plot is guaranteed to have lower efficiency, since it applies additional requirements on accepted roads.
Efficiency (w.r.t ‘truth’)

Default bank

Default bank + road filtering via shifted bank

Note that truth matching problem is yet unresolved.
So, on the absolute scale, both efficiencies are low.
But, they are extremely similar!
Fakes (w.r.t IPAT)

Default bank

Ftk tracks matched to ipat

>1 match (0.0 %)

Default bank + road filtering via shifted bank

Ftk tracks matched to ipat

>1 match (0.0 %)

no match (19.6 %)

Slightly lower # of fakes: the roads that we dropped were “bad” roads to begin with
# fits per event per crate

## Default bank

### 11/11 fits

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

- Entries: 250
- Mean: 4.18e+05
- RMS: 1.96e+06
- Underflow: 0
- Overflow: 0

### 10/11 fits

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

- Entries: 250
- Mean: 6.124e+05
- RMS: 2.036e+06
- Underflow: 0
- Overflow: 0

### 10/11 majority-recovered fits

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

- Entries: 250
- Mean: 4.18e+06
- RMS: 1.96e+07
- Underflow: 0
- Overflow: 0

## Default bank + road filtering via shifted bank (sector cut only)

### 3% less

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

- Entries: 250
- Mean: 4.05e+05
- RMS: 1.938e+06
- Underflow: 0
- Overflow: 0

### 10% less

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

- Entries: 250
- Mean: 5.438e+05
- RMS: 1.916e+06
- Underflow: 0
- Overflow: 0

### 3% less

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

- Entries: 250
- Mean: 4.05e+06
- RMS: 1.938e+07
- Underflow: 0
- Overflow: 0
#  

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

Entries: 250  
Mean: 4.18e+05  
RMS: 1.96e+06  
Underflow: 0  
Overflow: 0  

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

Entries: 250  
Mean: 6.124e+05  
RMS: 2.036e+06  
Underflow: 0  
Overflow: 0  

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

Entries: 250  
Mean: 4.18e+06  
RMS: 1.96e+07  
Underflow: 0  
Overflow: 0  

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**Default bank**

- **ALL(1): fits per event(all)**
  
  Entries: 250  
  Mean: 4.18e+05  
  RMS: 1.96e+06  
  Underflow: 0  
  Overflow: 0  

- **ALL(1): fits per event(miss)**
  
  Entries: 250  
  Mean: 6.124e+05  
  RMS: 2.036e+06  
  Underflow: 0  
  Overflow: 0  

- **ALL(1): fits per event(maj)**
  
  Entries: 250  
  Mean: 4.18e+06  
  RMS: 1.96e+07  
  Underflow: 0  
  Overflow: 0  

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**Default bank + road filtering via shifted bank**

- **ALL(1): fits per event(all)**
  
  Entries: 250  
  Mean: 3.748e+05  
  RMS: 1.826e+06  
  Underflow: 0  
  Overflow: 0  

- **ALL(1): fits per event(miss)**
  
  Entries: 250  
  Mean: 4.374e+05  
  RMS: 1.606e+06  
  Underflow: 0  
  Overflow: 0  

- **ALL(1): fits per event(maj)**
  
  Entries: 250  
  Mean: 3.748e+06  
  RMS: 1.826e+07  
  Underflow: 0  
  Overflow: 0  

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**10% less**  

**28% less**  

**10% less**
Average # fits per road

**Default bank**

**ALL(1): fits per road(all)**
- Entries: 1749477
- Mean: 59.73
- RMS: 527.5
- Underflow: 0
- Overflow: 0

**ALL(1): fits per road(miss)**
- Entries: 1749477
- Mean: 87.51
- RMS: 490.8
- Underflow: 0
- Overflow: 0

**ALL(1): fits per road(maj)**
- Entries: 1749477
- Mean: 597.3
- RMS: 5275
- Underflow: 0
- Overflow: 0

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**Default bank + road filtering via shifted bank**

**ALL(1): fits per road(all)**
- Entries: 962896
- Mean: 97.32
- RMS: 690.4
- Underflow: 0
- Overflow: 0

**ALL(1): fits per road(miss)**
- Entries: 962896
- Mean: 113.6
- RMS: 599.9
- Underflow: 0
- Overflow: 0

**ALL(1): fits per road(maj)**
- Entries: 962896
- Mean: 973.2
- RMS: 6904
- Underflow: 0
- Overflow: 0

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We filtered away “bad” roads. The roads that are left are good, and have more hits in them.
# roads

## # of unique sectors

### Default bank

**ALL(1): number of roads per bank**
- Entries: 250
- Mean: 6998
- RMS: 9246
- Underflow: 0
- Overflow: 0

**ALL(1): number of sectors per bank**
- Entries: 250
- Mean: 1825
- RMS: 1757
- Underflow: 0
- Overflow: 0

### Default bank + road filtering via shifted bank (sector cut only)

**ALL(1): number of roads per bank**
- Entries: 250
- Mean: 5372
- RMS: 7758
- Underflow: 0
- Overflow: 0

23% less

**ALL(1): number of sectors per bank**
- Entries: 250
- Mean: 1063
- RMS: 1129
- Underflow: 0
- Overflow: 0

42% less
Default bank

ALL(1): number of roads per bank

Entries 250
Mean 6998
RMS 9246
Underflow 0
Overflow 0

ALL(1): number of sectors per bank

Entries 250
Mean 1825
RMS 1757
Underflow 0
Overflow 0

Default bank + road filtering via shifted bank

ALL(1): number of roads per bank

Entries 250
Mean 3852
RMS 5520
Underflow 0
Overflow 0

ALL(1): number of sectors per bank

Entries 250
Mean 886.2
RMS 927.3
Underflow 0
Overflow 0

45% less

51% less
Observations

- Procedure tends to kill many ‘fake’ roads, which don't have many hits anyway
  - Total reduction in #fits is 10% - 20%
  - But: we are still fitting in the entire SS width!
    - Expect far greater reduction in #fits!
- **Huge reduction in #sectors** – can help greatly with FPGA↔memory IO
- **Caveat**: might not be as useful as it seems:
  - Currently not using cross-sector RW
  - Currently not cleaning bank via Guido's script