

# Problem in Trigger Package

Trigger package looks for 3-in-a-row in towers.

- Iteration over tracker planes forms map to see if plane had a hit.
- Problem is that it assumes `TkrDigiCol` implies a hit on the plane.
- Sometimes this is not the case....must test to see if a hit exists. (Can be caused by dead strips...collection is formed...but then no real hit.)

Fix to both `TriggerAlg.cxx` and `ThrottleAlg.cxx`:

```
// this loop sorts the hits by setting appropriate bits in the tower-plane hit map
for( Event::TkrDigiCol::const_iterator it = planes.begin(); it != planes.end(); ++it){
    const TkrDigi& t = **it;
    if(t.getNumHits()==0) continue; ← MUST BE ADDED
    layer_bits[std::make_pair(t.getTower(), t.getView())] |= layer_bit(t.getBilayer());
}
```

This change did not make it into DC2. The fix to `TriggerAlg` has been in cvs a few months, but the change to `ThrottleAlg` only recently went into CVS.

# Testing the Effect

- Generated Background Monte Carlo with v7r3p20:

Sources:

```
FluxAlg.sources = {"CrProtonMix"};  
FluxAlg.sources += {"CrElectronMix"};  
FluxAlg.sources += {"CrPositronMix"};  
FluxAlg.sources += {"CrAlpha"};  
FluxAlg.sources += {"CrHeavyIon"};  
FluxAlg.sources += {"Earth10"};  
FluxAlg.sources += {"clock"};
```

- Generated XX events and produced MeritTuple
- Generated same events with and without Bug Fix and then looked a how the trigger fired.

# Trigger & Filter Conditions

TrigCon1: Tkr&!Veto & calHi

TrigCon2: Tkr&(!Veto||calLo) & calHi

TrigCon3: (Tkr&!Veto) || calHi

Filter Condition: FilterStatus\_HI == 0

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I believe these  
match Steve's  
Definitions

- Using MeritTuple checked:
  - How often individual trigger bits are set.
  - How many events pass hardware trigger conditions
  - How many events pass hardware trigger + Filter
- Compared 2 (3) Cases:
  - Default code
  - Bug Fix the Trigger Package
  - New EbfWriter and OnboardFilter

Caution: Needs to be  
revisited...possible  
problem with pedestals  
used for generation.

| Code          | Default            | Trigger Bug Fix    | Ratio              | New EBF +OBF | Ratio |
|---------------|--------------------|--------------------|--------------------|--------------|-------|
| Tkr           | <b>31858</b>       | <b>30595</b>       | <b>0.96</b>        | 30503        |       |
| CalLo         | 5796               | 5796               | 1.0                | 5785         |       |
| CalHi         | 782                | 782                | 1.0                | 781          |       |
| CNO           | 5423               | 5423               | 1.0                | 5421         |       |
| TCon1         | 7843               | 7712               | 0.98               | 7692         |       |
| TCon1+ Filter | 1936               | 1639               | 0.85               | 1583         |       |
| TCon2         | <b>10757</b>       | <b>10578</b>       | <b>0.98</b>        | 10555        |       |
| TCon2+ Filter | <b><u>2021</u></b> | <b><u>1717</u></b> | <b><u>0.85</u></b> | 1632         |       |
| TCon3         | 12336              | 12217              | 0.99               | 12188        |       |
| TCon3+ Filter | 2048               | 1744               | 0.85               | 1719         |       |

Caution: Needs checking.

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# Still working...

- Need to understand why such a big impact on Filtered events.
- Explore differences between old EbfWriter/OnboardFilter and new versions (original goal).

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