Subject: [FIXED] Double tracks/double MC match issue
Posted by Klaus Götzen   on Fri, 31 Jan 2014 07:16:23 GMT

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Hi,

I took another look to the track doublers and the multiple MC match (multiple tracks point to the same MC truth object) issue for release dec13 and a current trunk (rev 23404).

Therefore I ran the standard macros in macro/run and afterwards a modified ana_complete.C

The subroutine to count the doublers is essentially a nested loop to compare each track pair in the charged list and looks like this:

```
double d=0.0001;
for (int i=0;i<l.GetLength()-1;++i)
{
  for (int j=i+1;j<l.GetLength();++j)
  {
    TLorentzVector dl = l[i]->P4() - l[j]->P4();
    bool chkmc = (l[i]->GetMcTruth()==l[j]->GetMcTruth());
    bool chktrk = (fabs(dl.X())<d) && (fabs(dl.Y())<d) && (fabs(dl.Z())<d) && (fabs(dl.E())<d);
    if (chkmc) n_smc++;   // double MC reference
    if (chktrk) n_strk++;  // double track
    if (chktrk && chkmc) n_both++; // both at the same time
  }
}
```

I summed these counters for 100 psi' -> J/psi (mu+ mu-) pi+ pi- events (expected total primary #tracks = 400) and the results were:

dec13 -> Trk:470 Dbl trk:66 Dbl MC:170 Both:66
trunk -> Trk:324 Dbl trk:0   Dbl MC:27   Both:0

So for release dec13 we see many more tracks (+150 compared to current trunk), which obviously cannot be explained purely with the track doublers, which are only counted to be 66. The number of double MC references is also much higher. All double tracks seem to point to the same MC object (at least this is consistent...)

Concerning MC truth tree matching, for my J/psi example, I got the following number of events with more than 1 truth matched composite (J/psi and psi')

dec13 -> #ev(mult J/psi):62/100 #ev(mult psi'):27/100
trunk -> #ev(mult J/psi):11/100 #ev(mult psi'):2/100

My conclusion is (maybe limited due to the low number of events):

- The double track issue seems to be solved, since no double tracks are present in the current

trunk (in this example).

- The MC doublers issue also is improved, but it still might spoil efficiency calculations due to too large number of truth match composites, perhaps faking a too good efficiency.

- The dec13 release basically seems unusable for anything with this huge problem. It might be a good idea to either remove it or patch it in the sense, that the track doublers vanish.

Best regards,
Klaus