

Exercise 1

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- Find out how often there is more than one isolated, reconstructed muon in data. Where could these additional muons come from?
- What if you apply a trigger selection?

```
// Remember it's only in top sample!
///// Exercise 1: Invariant Di-Muon mass
int N_IsoMuon = 0, N_IsoTriggerMuon = 0;

for(vector<MyMuon>::iterator jt = Muons.begin(); jt != Muons.end(); ++jt){

    if(jt->IsIsolated(MuonRelIsoCut) && triggerIsoMu24 == 1){
        ++N_IsoTriggerMuon;
    }

    if (jt->IsIsolated(MuonRelIsoCut)){
        ++N_IsoMuon;

        if (N_IsoMuon == 1) muon1 = &(* jt);
        if (N_IsoMuon == 2) muon2 = &(* jt);
    }
}

h_NMuon->Fill(N_IsoMuon, EventWeight);
h_myhisto->Fill(N_IsoTriggerMuon, EventWeight);
```

- Compute trigger efficiency using top sample.

```
int N_IsoMuon = 0, N_IsoTriggerMuon = 0;

for(vector<MyMuon>::iterator jt = Muons.begin(); jt != Muons.end(); ++jt){

    if(jt->IsIsolated(MuonRelIsoCut) && triggerIsoMu24 == 1){
        ++N_IsoTriggerMuon;
        h_num_pt->Fill(jt->Pt(), EventWeight);
        h_num_eta->Fill(jt->Eta(), EventWeight);
    }

    if (jt->IsIsolated(MuonRelIsoCut)){
        ++N_IsoMuon;
        h_den_pt->Fill(jt->Pt(), EventWeight);
        h_den_eta->Fill(jt->Eta(), EventWeight);

        if (N_IsoMuon == 1) muon1 = &(* jt);
        if (N_IsoMuon == 2) muon2 = &(* jt);
    }
}
```

- Calculate the invariant mass of two muons of opposite charge. (Only use isolated muons)

- Display the invariant mass distribution of two muons in a histogram