Introduction of Secondary Vertexing Class for Tagging Beauty Electron

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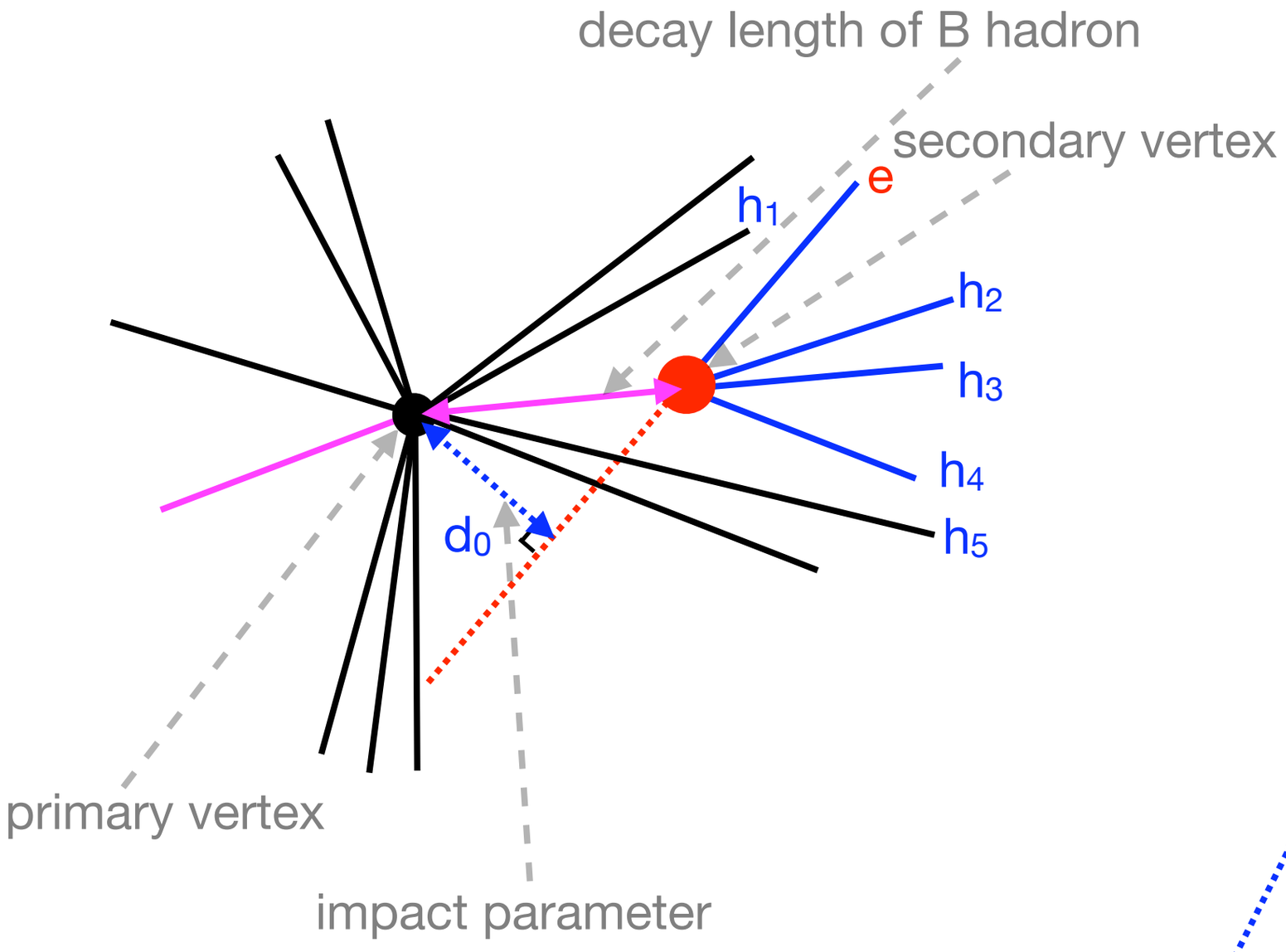
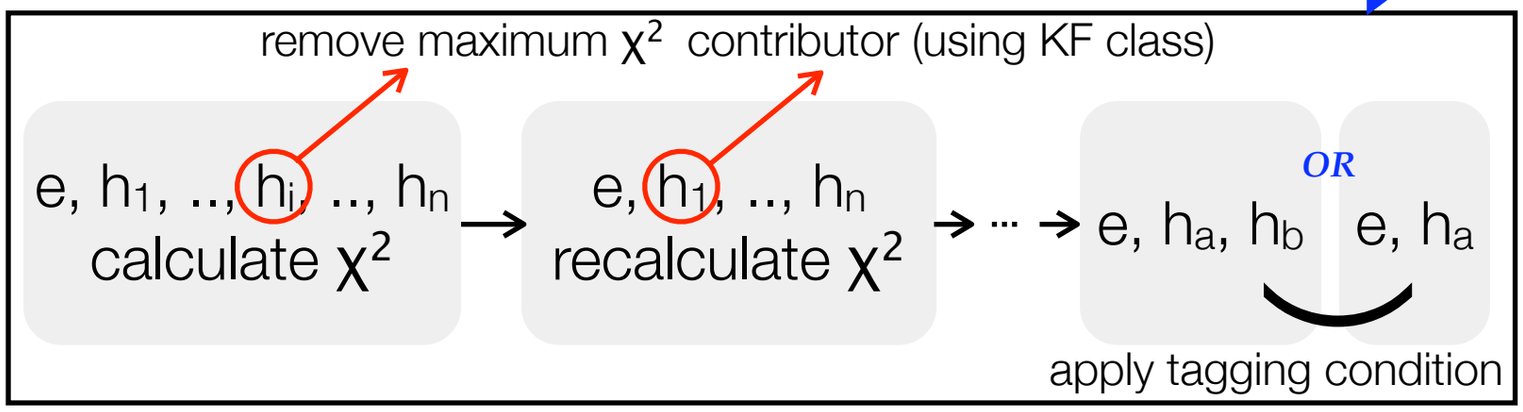
Beauty Tagging using Secondary Vertexing

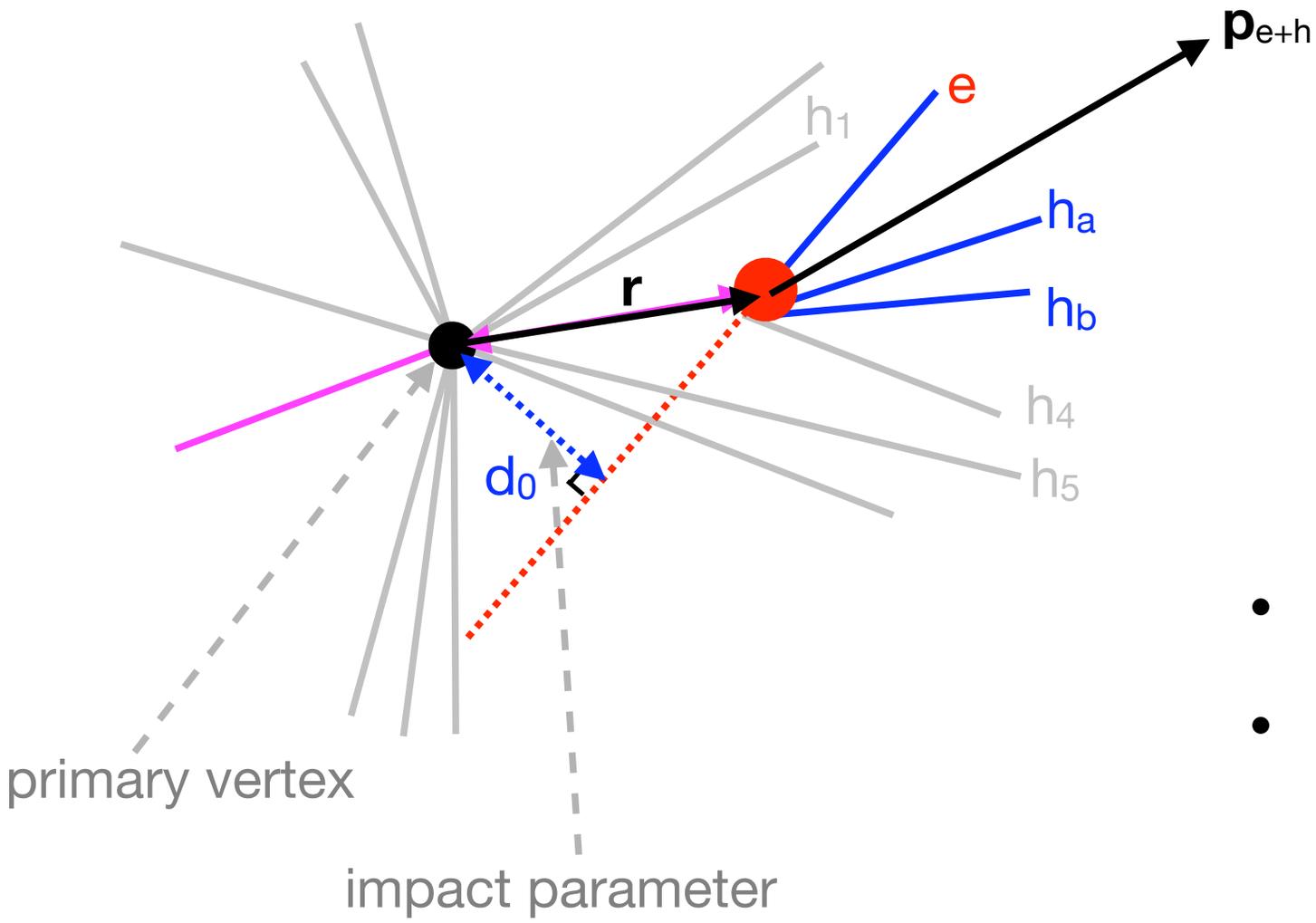


- Analysis procedure
  - HFE electron selection
  - single track selection
  - e-h_i pair selection
    - remove photonic e using e-e veto
  - <u>construct secondary vertex</u> and apply <u>tagging condition</u>

which is based on:
- long life time (~ 500 μm)
- large mass (~ 5 GeV/c^2)



Distinctive Variables for Tagging



- HFE electron requirement
- impact parameter of single tracks

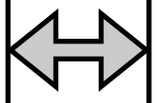
secondary vertexing class

- secondary vertex χ^2
- invariant mass of e, h_a, h_b or e, h_a
- signed $L_{xy} = r \cdot p_{e+h} / |p_{e+h}|$

Implementation as part of HFE package

- HFE
  - AliHFEpid
  - AliHFEcuts
  - ...
  - AliHFEsecVtx

- Analysis procedure
  - HFE electron selection
  - single track selection
  - e-h_i pair selection
    - remove photonic e using e-e veto(not yet imp.)
  - construct secondary vertex and apply tagging condition
- Output histograms are separately stored in dedicated tree

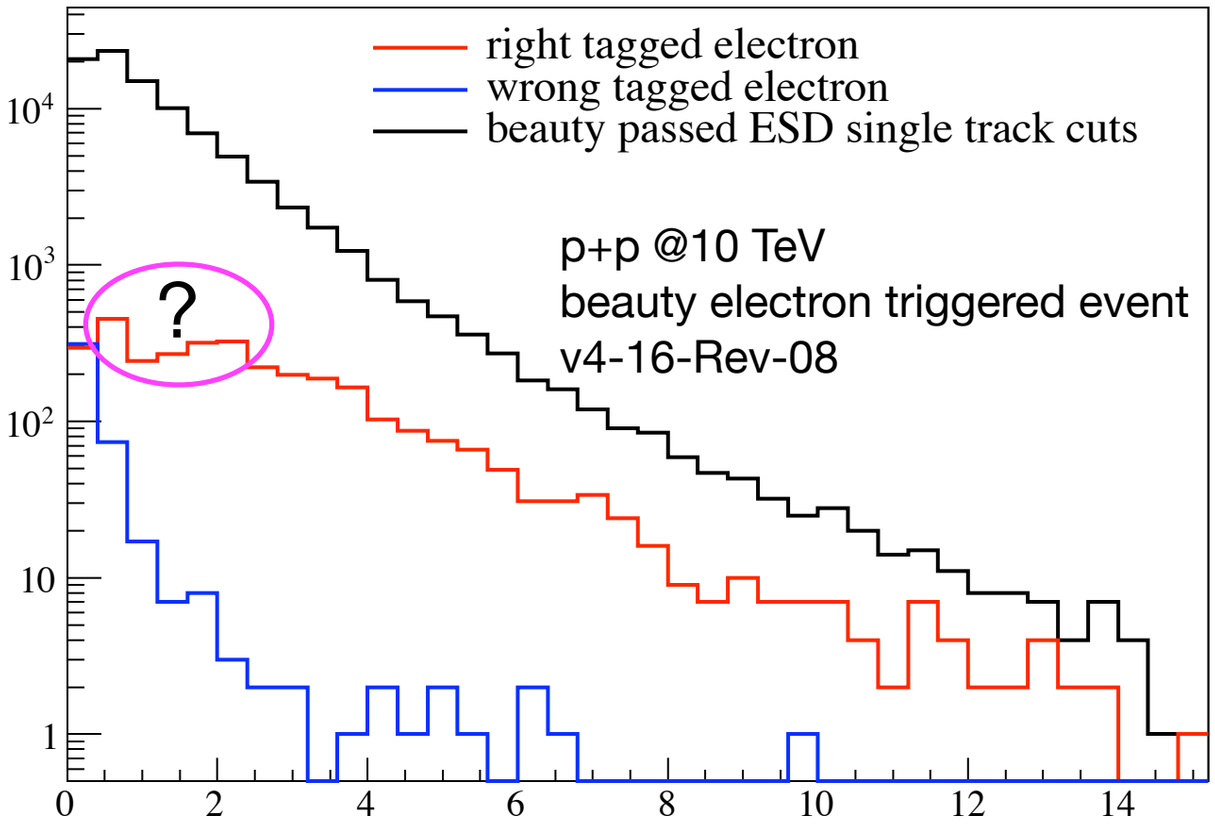


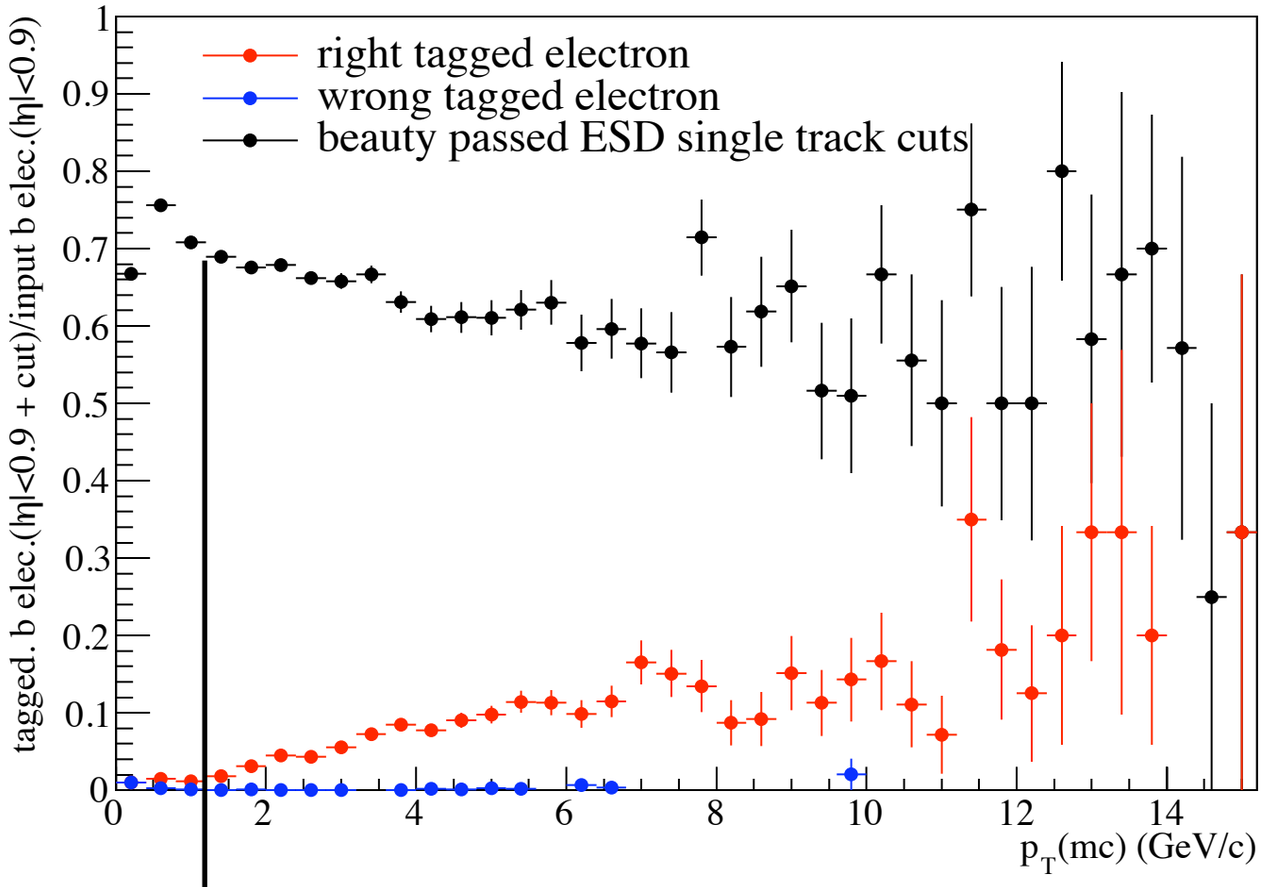
```
// instantiate
fSECVTX = new AliHFEsecVtx;
...
// single track loop
for(Int_t itrack = 0; itrack < fESD->GetNumberOfTracks(); itrack++){
      if(!fPID->IsSelected(track)) continue;

      // start pair analysis
      if (fEnableSECVTX) {
        ...
        for(Int_t jtrack = 0; jtrack < fESD->GetNumberOfTracks(); jtrack++){
              htrack = fESD->GetTrack(jtrack);
              ...
              // single track cut
              if(!fSECVTX->SingleTrackCut(htrack)) continue;
              // now you make a e-h pair and store partner info as private member
              // if it pass a certain cut
              fSECVTX->AnaPair(track, htrack);
        }
        // run secondary vertexing algorithm based on the above e and hadron tracks,
        // and apply tagging cut
        fSECVTX->RunSECVTX(track);
      }
}
```

Purity and Efficiency (with Preliminary cuts)

- True/False b-Tagging and tagging efficiency (done with beauty triggered sample)





have to understand single track efficiency first

- Understanding on the individual variables should be ahead

Short Term To-Do and Open Issue

- Use of reconstructed PID
- Understanding of single track impact parameter cut
- Input PID for tracks constructing KF particle?
- How often the secondary tracks are included in the primary vertex and resulting bias on primary vertex due to those tracks?