

sPHENIX D_s Meson Simulation Studies

sPHENIX HF Topical Group Meeting

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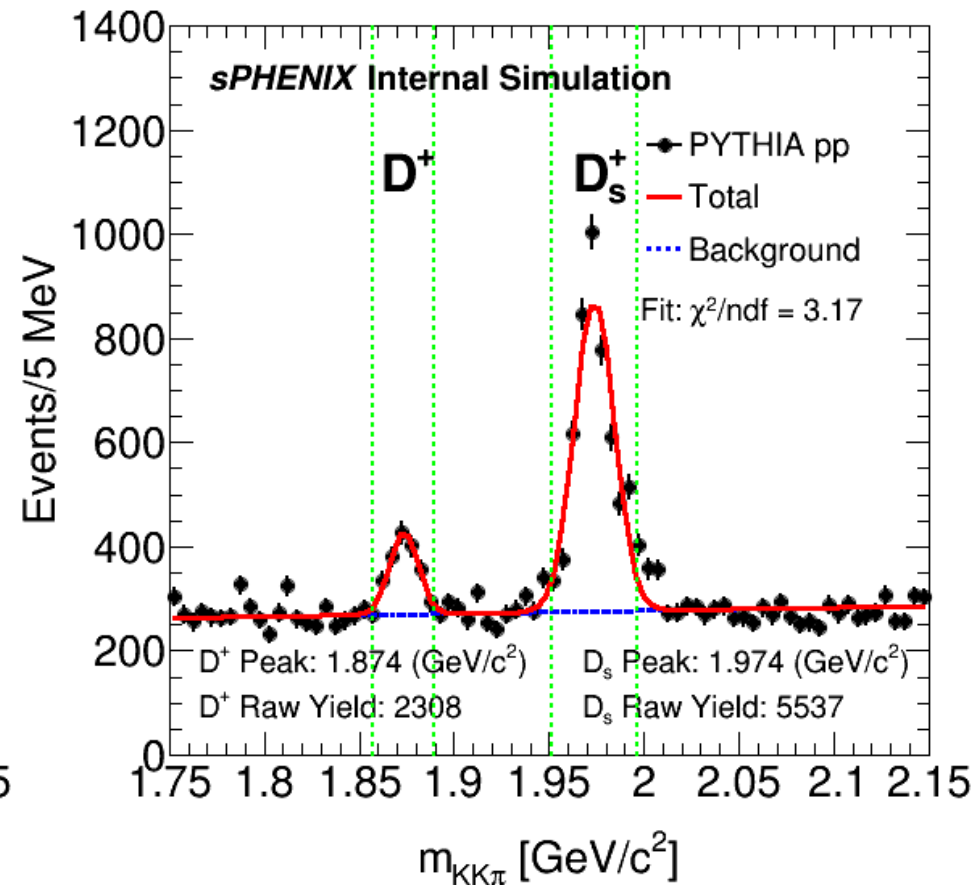
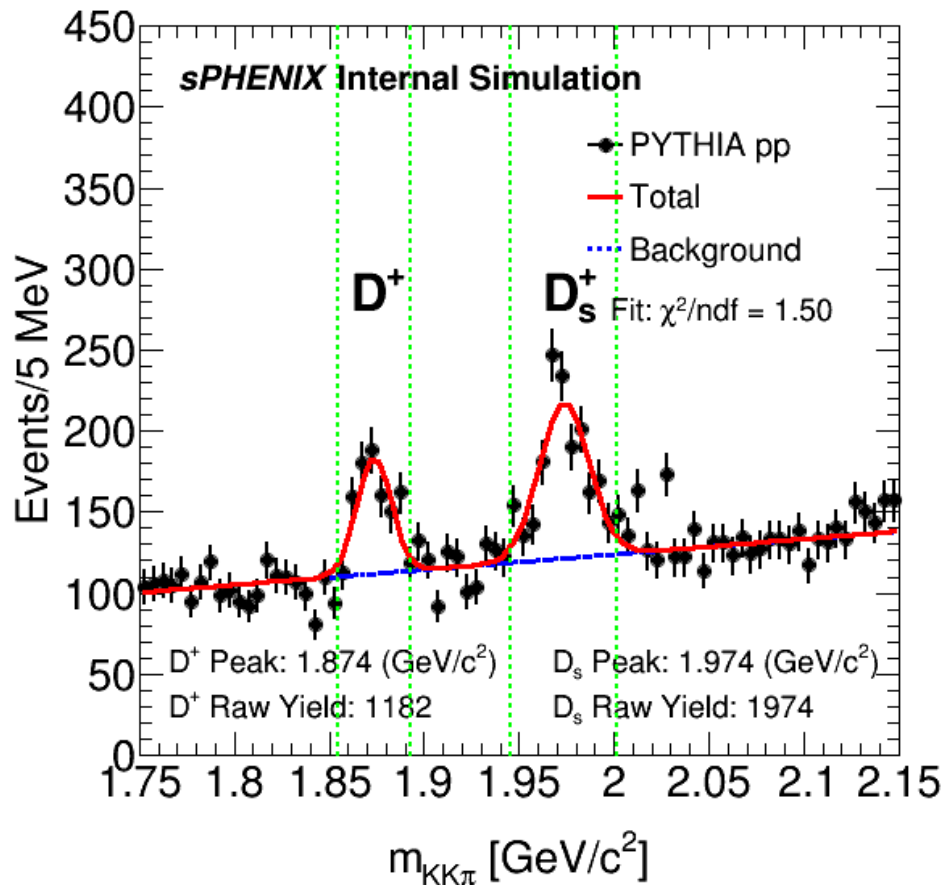
05/03/2021

Overview of D_s Studies

- Fully reconstructing D_s from $KK\pi$ from both MDC $c\bar{c}$ and $b\bar{b}$ samples using the KF particle package developed by Cameron
- Loose pre-filter selection in the KF particle machinery:

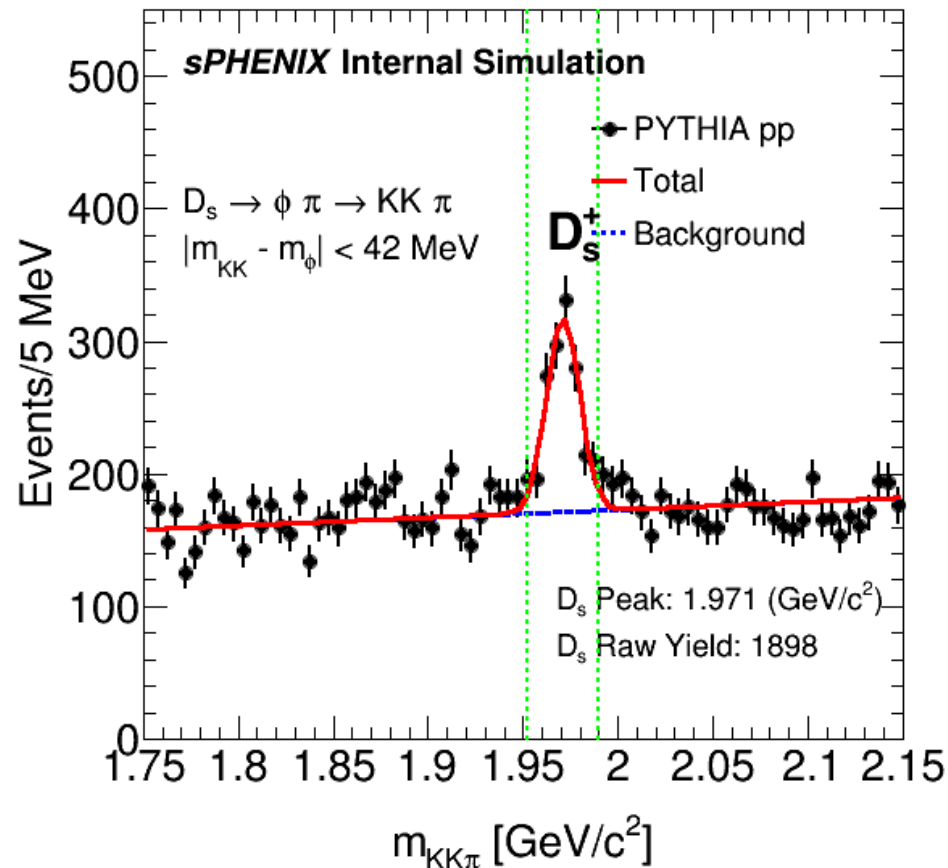
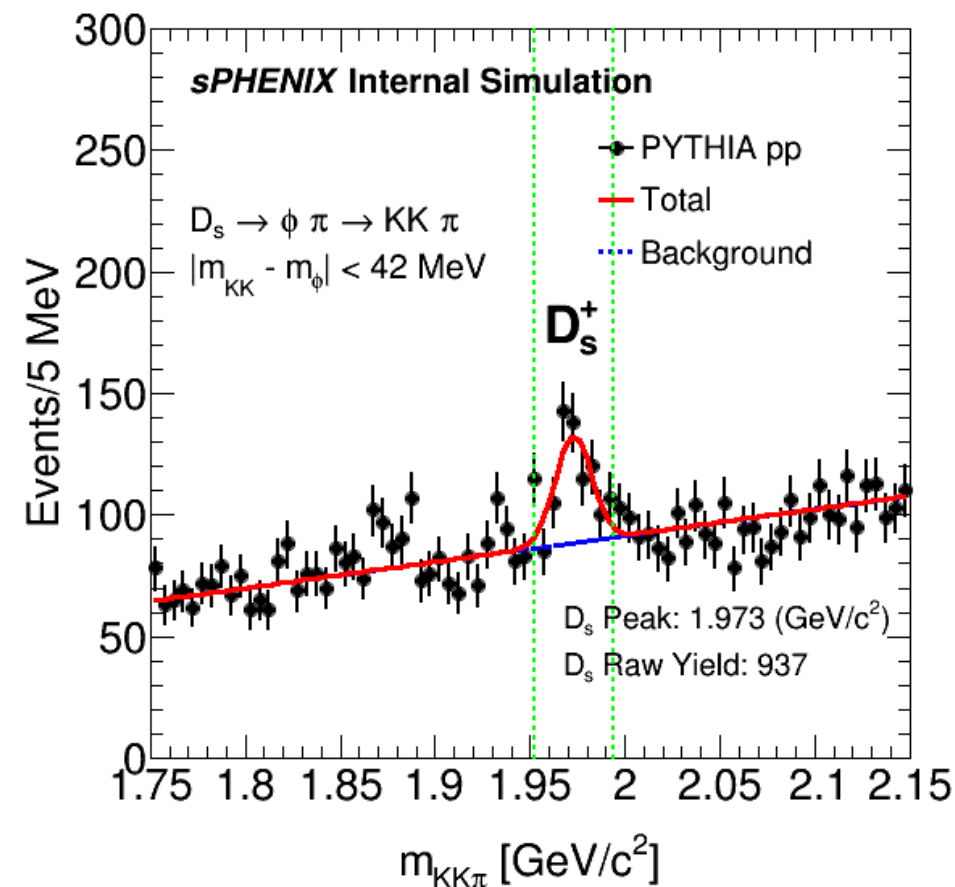
```
kfparticle->setMinimumTrackPT(0.1);  
kfparticle->setMinimumTrackIPchi2(-1);  
kfparticle->setMaximumTrackchi2nDOF(40);  
kfparticle->setMaximumVertexchi2nDOF(40);  
kfparticle->setMaximumDaughterDCA(0.1);  
kfparticle->setFlightDistancechi2(0);  
kfparticle->setMinDIRA(0.0);  
kfparticle->setMotherPT(0);  
kfparticle->setMotherIPchi2(1e5);
```
- 8 files (< 1% of the total files) fails, which should have no significant affect on the overall statistics. Total events of the output = 45996177 events for $c\bar{c}$ and 69692042 for $b\bar{b}$ samples
- Apply addition selections on the truth information of the tracks to select D_s

$D_s \rightarrow K^+ K^- \pi$ from c cbar and b bbar Sample



- Same selection on the truth kinematic variables to both c cbar and b bbar samples
- In c cbar samples expected to have: $D^+ = 224576$ and $D_s = 544390$
- In b bbar samples expected to have: $D^+ = 266874$ and $D_s = 1301090$
- Prompt/Non-prompt D_s ratio = $5537/1974 \sim 2.8$ the ratio of expected is about 2.4

$D_s \rightarrow \phi \pi \rightarrow K^+ K^- \pi$ from $c \bar{c}$ and $b \bar{b}$ Sample



- In the $c \bar{c}$ sample, D_s with the resonance selection/ D_s without the resonance = $937/1974 = 0.475$
- For $b \bar{b}$ sample, the ratio is = $1898/5537 = 0.343$
- Both roughly consistent to the PDG BR ratio = $2.24\%/5.39\% = 0.416$