Control channels summary

All modes are normalized to 879,285 events

28 May 2024

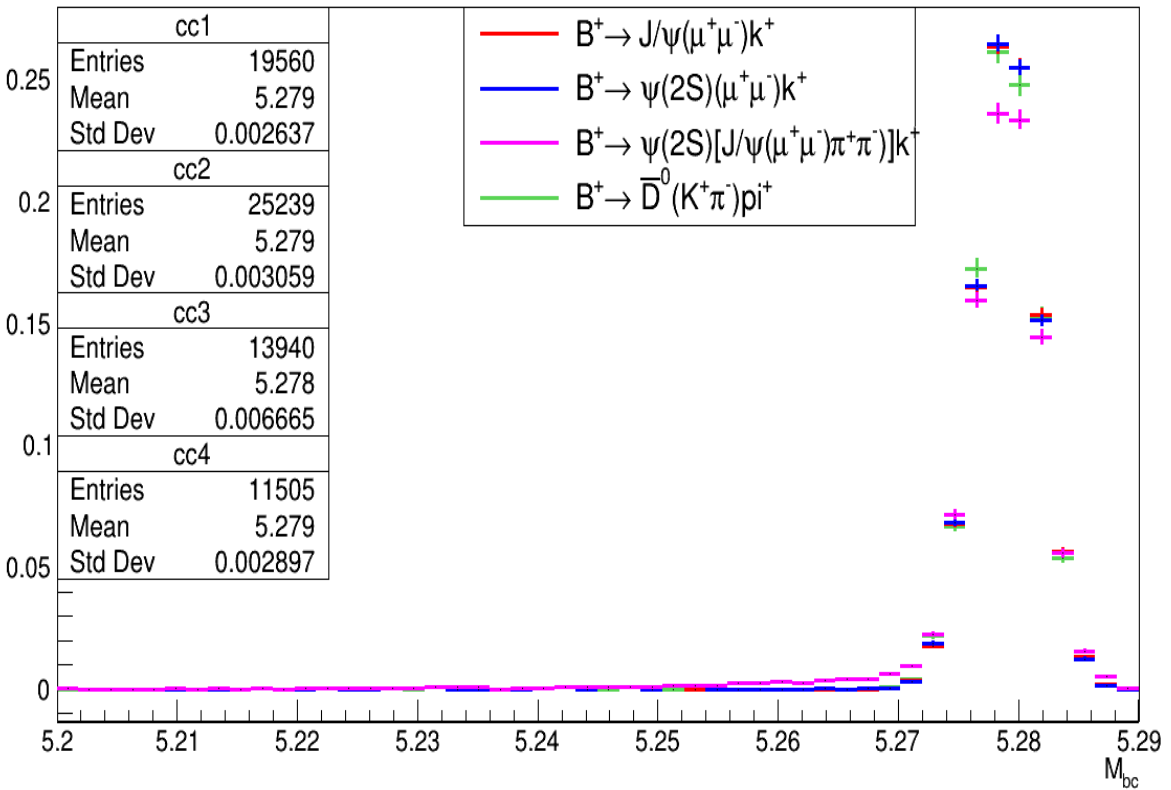
Modes

$B^+ \rightarrow J/Psi\ K^+$	1.02×10^{-3}
$J/Psi \rightarrow mu^+\ mu^-$	5.973%
$B^+ \rightarrow Psi(2S)\ K^+$	6.24×10^{-4}
$Psi(2S) \rightarrow mu^+\ mu^-$	8×10^{-3}
$B^+ \rightarrow Psi(2S)\ K^+$	6.24×10^{-4}
$Psi(2S) \rightarrow J/Psi\ pi^+pi^-$	34 %
$B^+ \rightarrow \overline{D}^0\ pi^+$	4.61×10^{-3}
$\overline{D}^0 \rightarrow K^+\ pi^-$	3.947 %

M_{bc}

Cuts applied

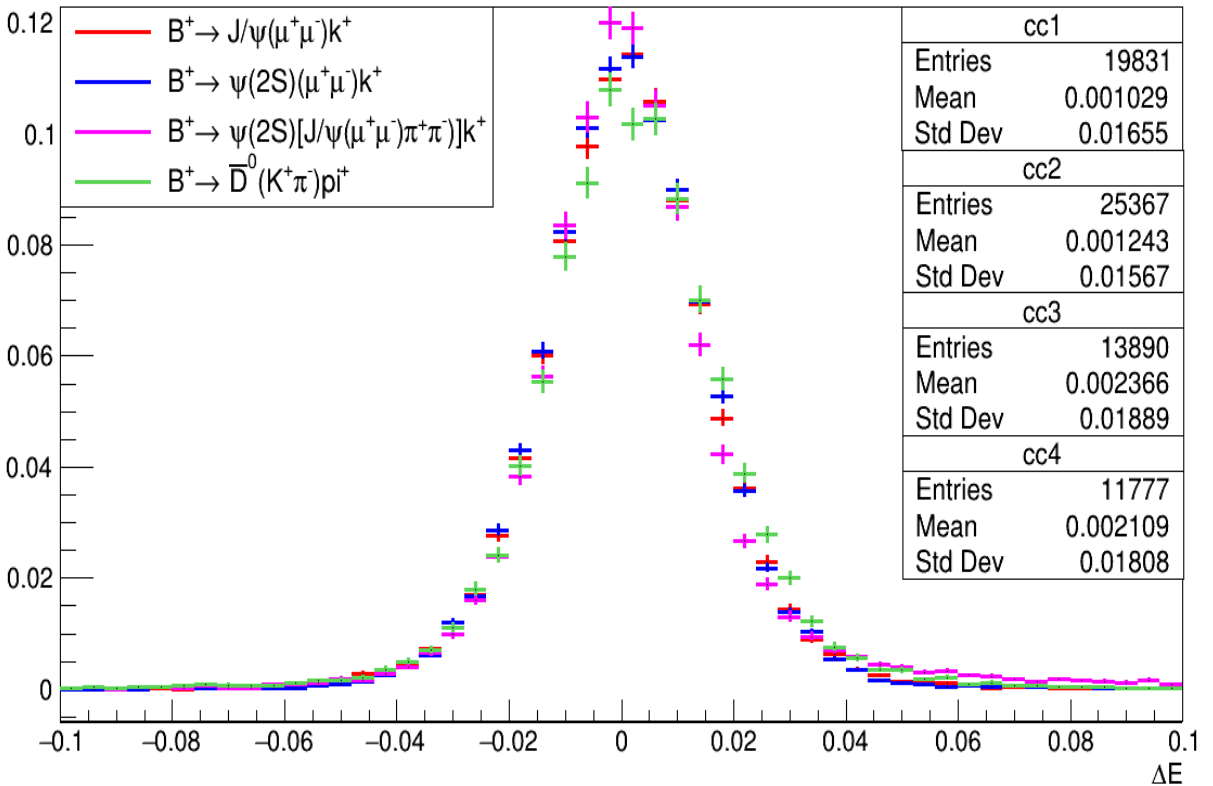
- Rank 1
- -0.050 < ΔE < 0.050 GeV
- abs(sin_phi) < 1.2
- abs(cos(p_{Btag},p_{vistag})) < 1.25
- 1.83 < m_D < 1.89 GeV
- 1.7 < m_{hadROE} < 2.2 , 3.646 < $m_{Psi(2S)}$ < 3.726 , 3.056 < $m_{J/Psi}$ < 3.136 GeV



ΔE

Cuts applied

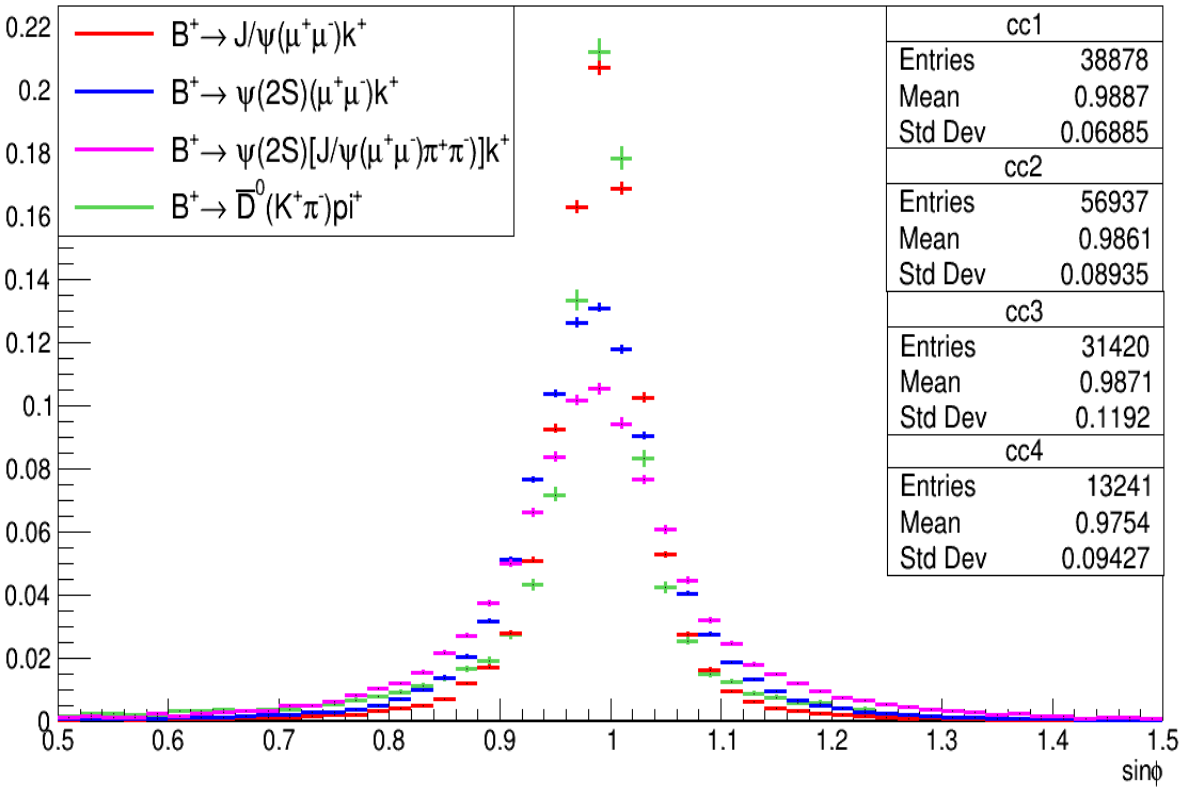
- Rank 1
- M_{bc} > 5.27 GeV
- abs(sin_phi) < 1.2
- abs(cos(p_{Btag},p_{vistag})) < 1.25
- 1.83 < m_D < 1.89 GeV
- 1.7 < m_{hadROE} < 2.2 , 3.646 < $m_{Psi(2S)}$ < 3.726 , 3.056 < $m_{J/Psi}$ < 3.136 GeV



Sin_phi

Cuts applied

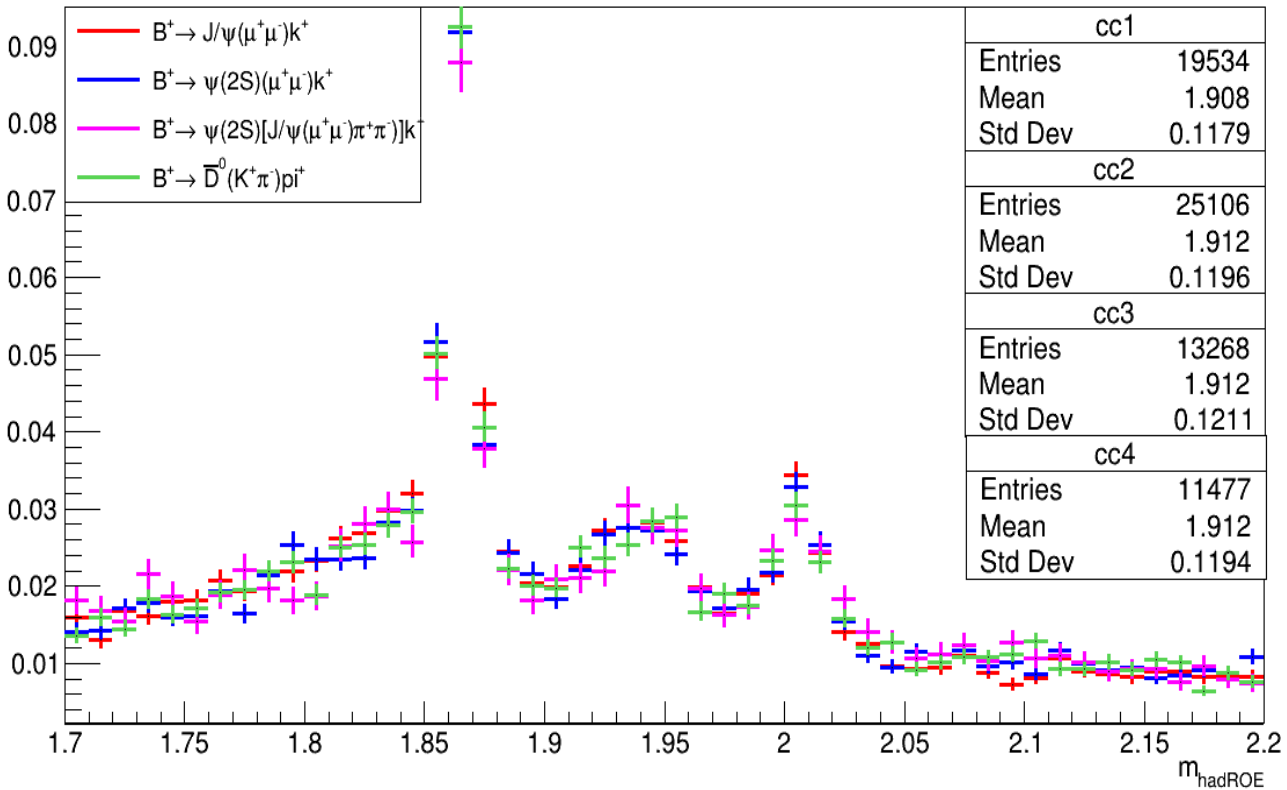
- Rank 1
- M_{bc} > 5.27 GeV
- -0.050 < ΔE < 0.050 GeV
- abs(cos(p_{Btag},p_{vistag})) < 1.25
- 1.83 < m_D < 1.89 GeV
- 1.7 < m_{hadROE} < 2.2 , 3.646 < $m_{Psi(2S)}$ < 3.726 , 3.056 < $m_{J/Psi}$ < 3.136 GeV



m_{hadROE}

Cuts applied

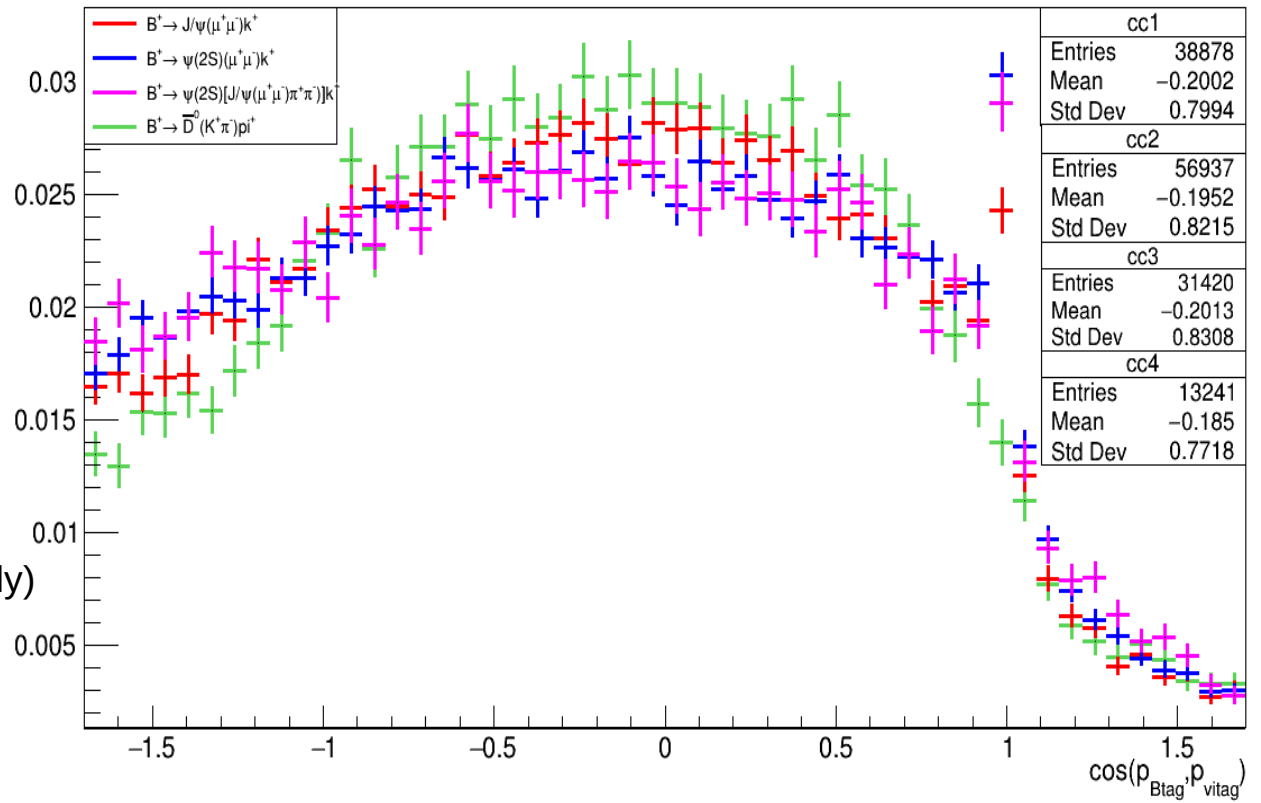
- Rank 1
- $M_{bc} > 5.27$ GeV
- $-0.050 < \Delta E < 0.050$ GeV
- abs(sin_phi) < 1.2
- $abs(\cos(p_{Btag}, p_{vistag})) < 1.25$
- $1.83 < m_D < 1.89$ GeV
- $1.7 < m_{hadROE} < 2.2$, $3.646 < m_{Psi(2S)} < 3.726$, $3.056 < m_{J/Psi} < 3.136$ GeV



$\cos(p_{Btag}, p_{vistag})$

Cuts applied

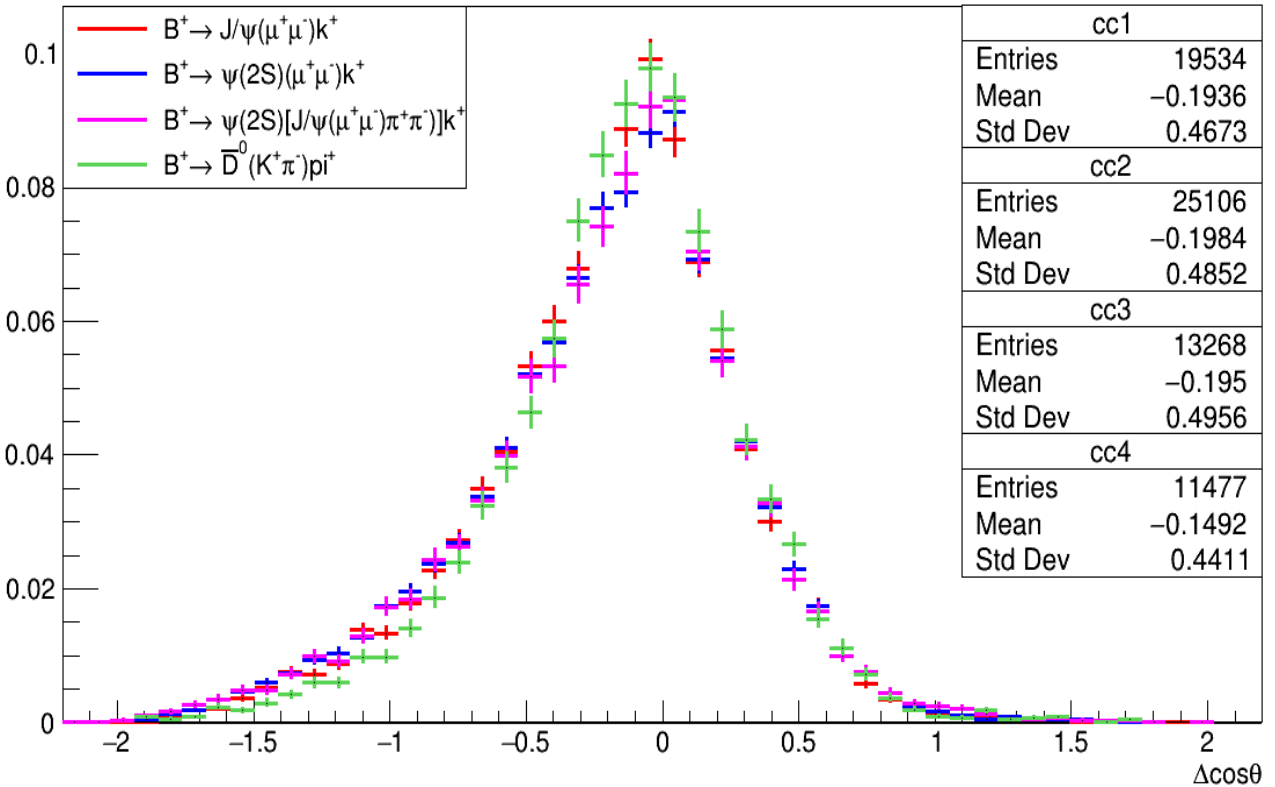
- Rank 1
- $M_{bc} > 5.27$ GeV
- $-0.050 < \Delta E < 0.050$ GeV
- abs(sin_phi) < 1.2
- $\text{abs}(\cos(p_{Btag}, p_{vistag})) < 1.7$ (CC4 only)
- $1.83 < m_D < 1.89$ GeV
- $1.7 < m_{hadROE} < 2.2$, $3.646 < m_{Psi(2S)} < 3.726$, $3.056 < m_{J/Psi} < 3.136$ GeV



Best sum of cosine angles

Cuts applied

- Rank 1
- M_{bc} > 5.27 GeV
- -0.050 < ΔE < 0.050 GeV
- abs(sin_phi) < 1.2
- abs(cos(p_{Btag},p_{vistag})) < 1.25
- 1.83 < m_D < 1.89 GeV
- 1.7 < m_{hadROE} < 2.2 , 3.646 < $m_{Psi(2S)}$ < 3.726 , 3.056 < $m_{J/Psi}$ < 3.136 GeV

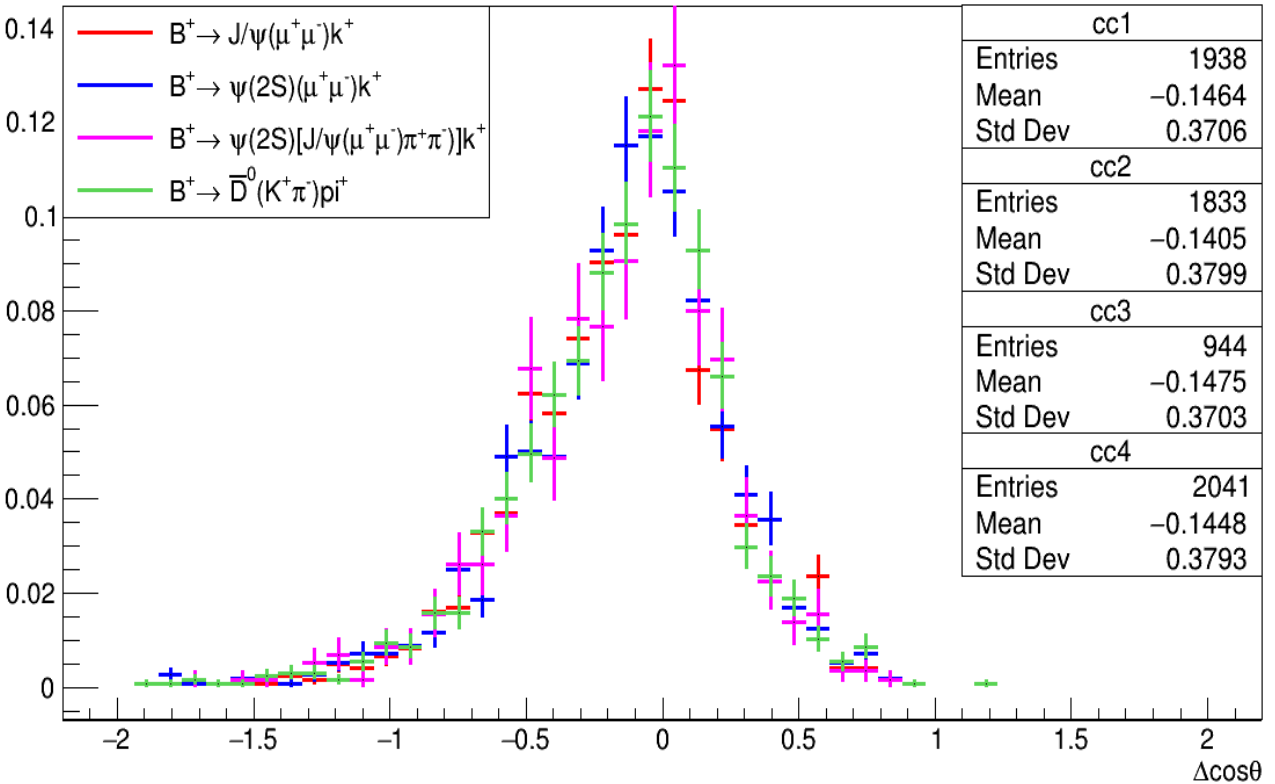


Back up

Best sum around D^0

Cuts applied

- Rank 1
- $M_{bc} > 5.27$ GeV
- $-0.050 < \Delta E < 0.050$ GeV
- abs(sin_phi) < 1.2
- $\text{abs}(\cos(p_{Btag}, p_{vistag})) < 1.25$
- $1.83 < m_D < 1.89$ GeV

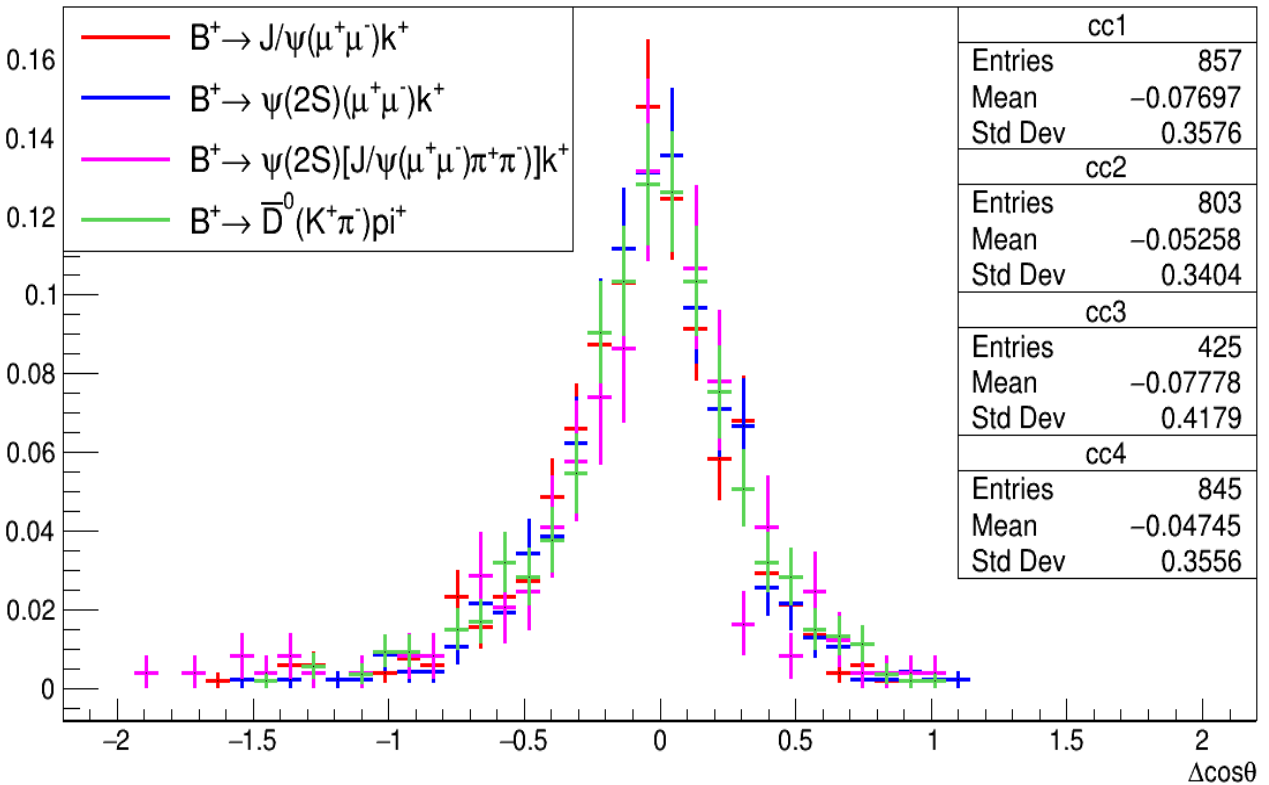


- $1.7 < m_{hadROE} < 2.2$, $3.646 < m_{Psi(2S)} < 3.726$, $3.056 < m_{J/Psi} < 3.136$, $\text{abs}(m_{hadROE} - 1.86) < 0.015$ GeV

Best sum around D^*

Cuts applied

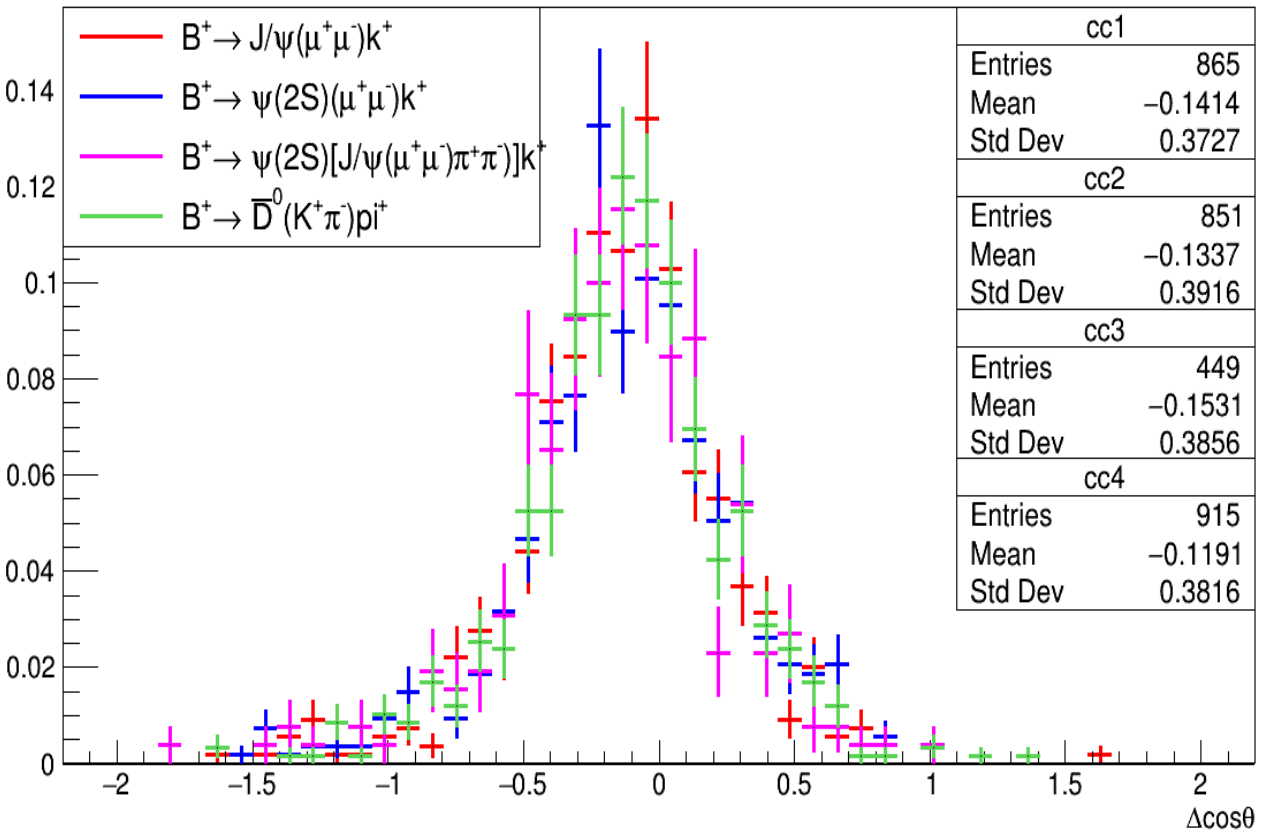
- Rank 1
- $M_{bc} > 5.27$ GeV
- $-0.050 < \Delta E < 0.050$ GeV
- abs(sin_phi) < 1.2
- $abs(\cos(p_{Btag}, p_{vistag})) < 1.25$
- $1.83 < m_D < 1.89$ GeV
- $1.7 < m_{hadROE} < 2.2$, $3.646 < m_{Psi(2S)} < 3.726$, $3.056 < m_{J/Psi} < 3.136$, $abs(m_{hadROE} - 2.006) < 0.015$ GeV



Best sum between D and D*

Cuts applied

- Rank 1
- M_{bc} > 5.27 GeV
- -0.050 < ΔE < 0.050 GeV
- abs(sin_phi) < 1.2
- abs(cos(p_{Btag},p_{vistag})) < 1.25
- 1.83 < m_D < 1.89 GeV

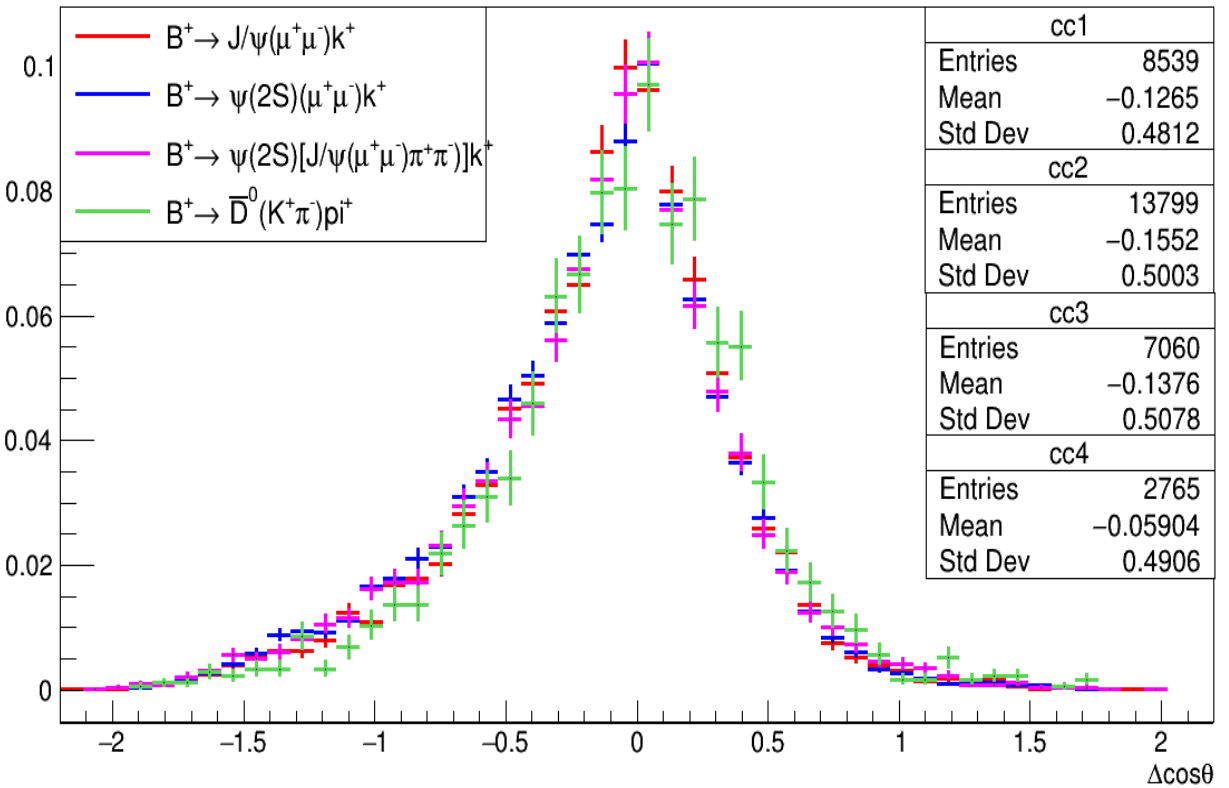


- 1.7 < m_{hadROE} < 2.2 , 3.646 < $m_{Psi(2S)}$ < 3.726 , 3.056 < $m_{J/Psi}$ < 3.136, abs(m_{hadROE} – 1.94) < 0.015 GeV

Best sum greater than D^*

Cuts applied

- Rank 1
- M_{bc} > 5.27 GeV
- -0.050 < ΔE < 0.050 GeV
- abs(sin_phi) < 1.2
- abs(cos(p_{Btag},p_{vistag})) < 1.25
- 1.83 < m_D < 1.89 GeV

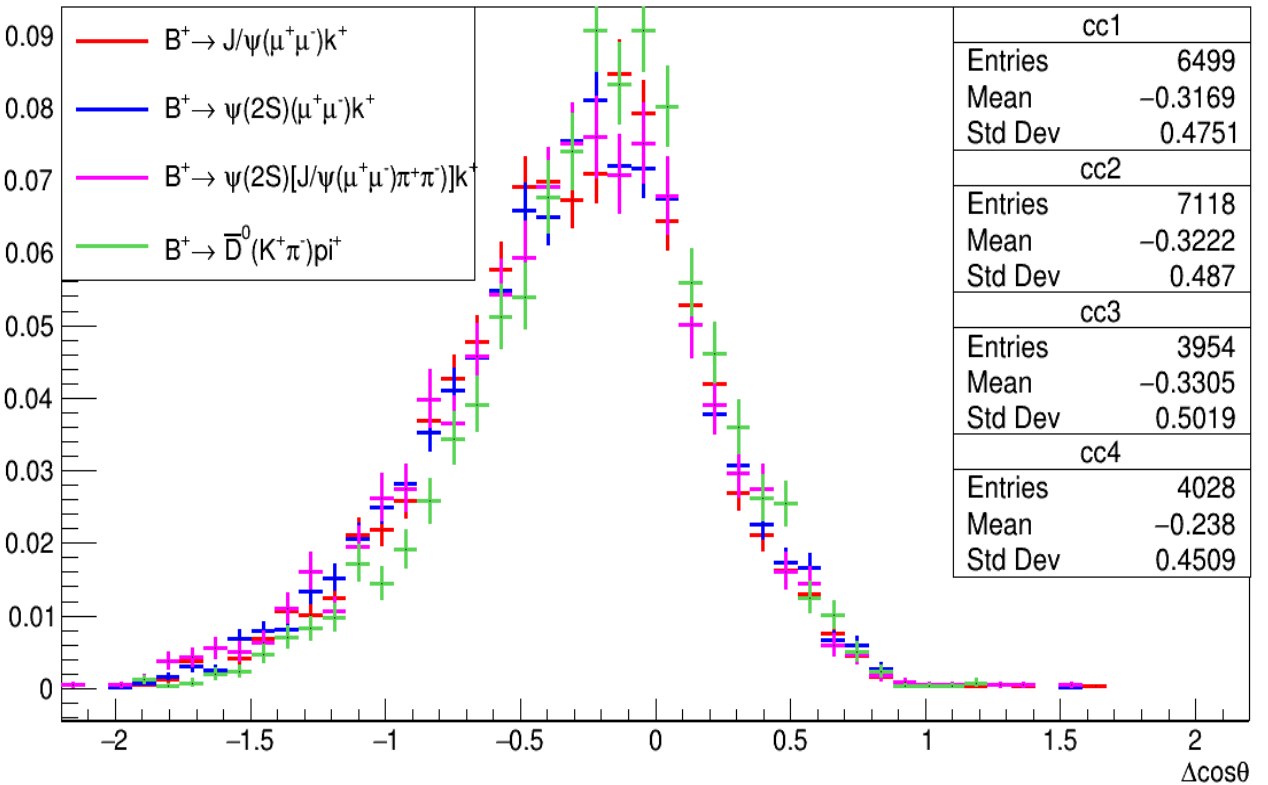


- 1.7 < m_{hadROE} < 2.2 , 3.646 < $m_{Psi(2S)}$ < 3.726 , 3.056 < $m_{J/Psi}$ < 3.136, m_{hadROE} > 2.006 GeV

Best sum less than D^0

Cuts applied

- Rank 1
- M_{bc} > 5.27 GeV
- -0.050 < ΔE < 0.050 GeV
- abs(sin_phi) < 1.2
- abs(cos(p_{Btag},p_{vistag})) < 1.25
- 1.83 < m_D < 1.89 GeV

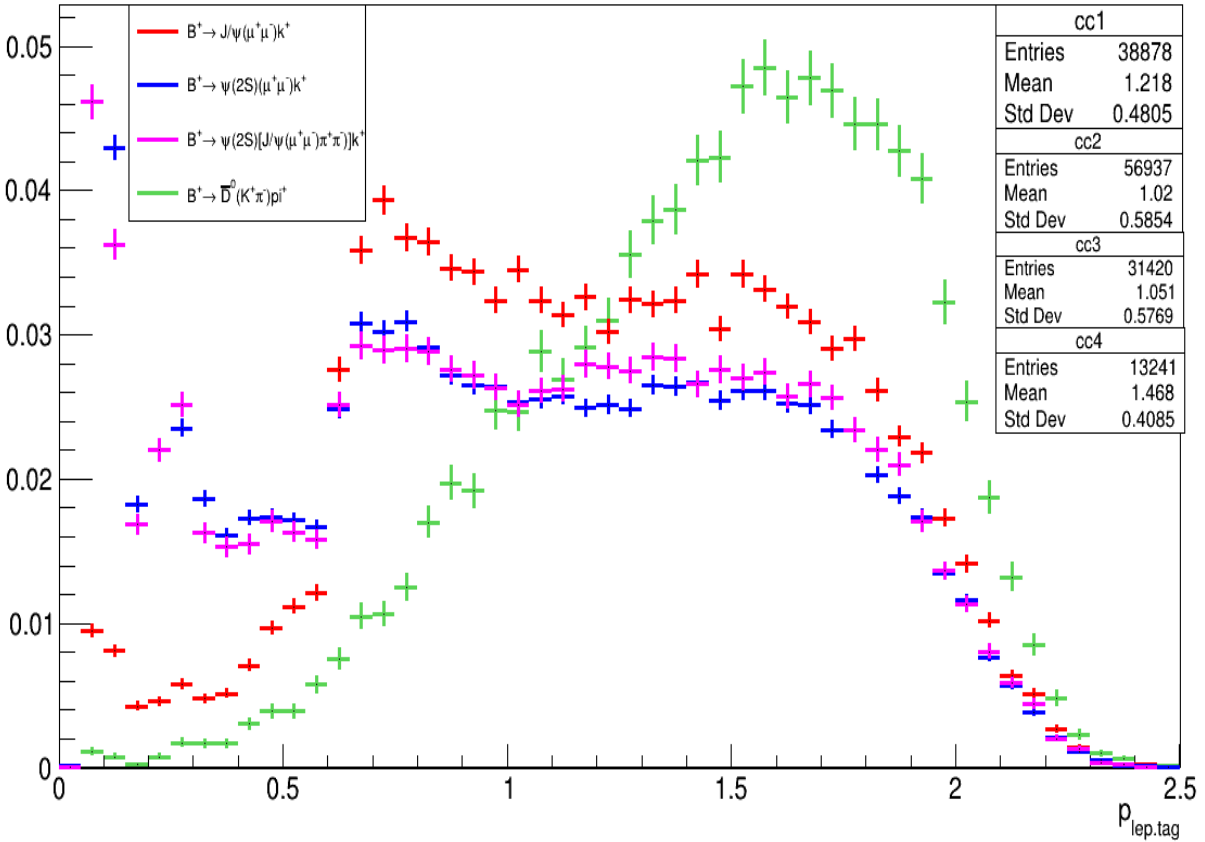


- 1.7 < m_{hadROE} < 2.2 , 3.646 < $m_{Psi(2S)}$ < 3.726 , 3.056 < $m_{J/Psi}$ < 3.136, m_{hadROE} < 1.86 GeV

$P_{lep.tag}$

Cuts applied

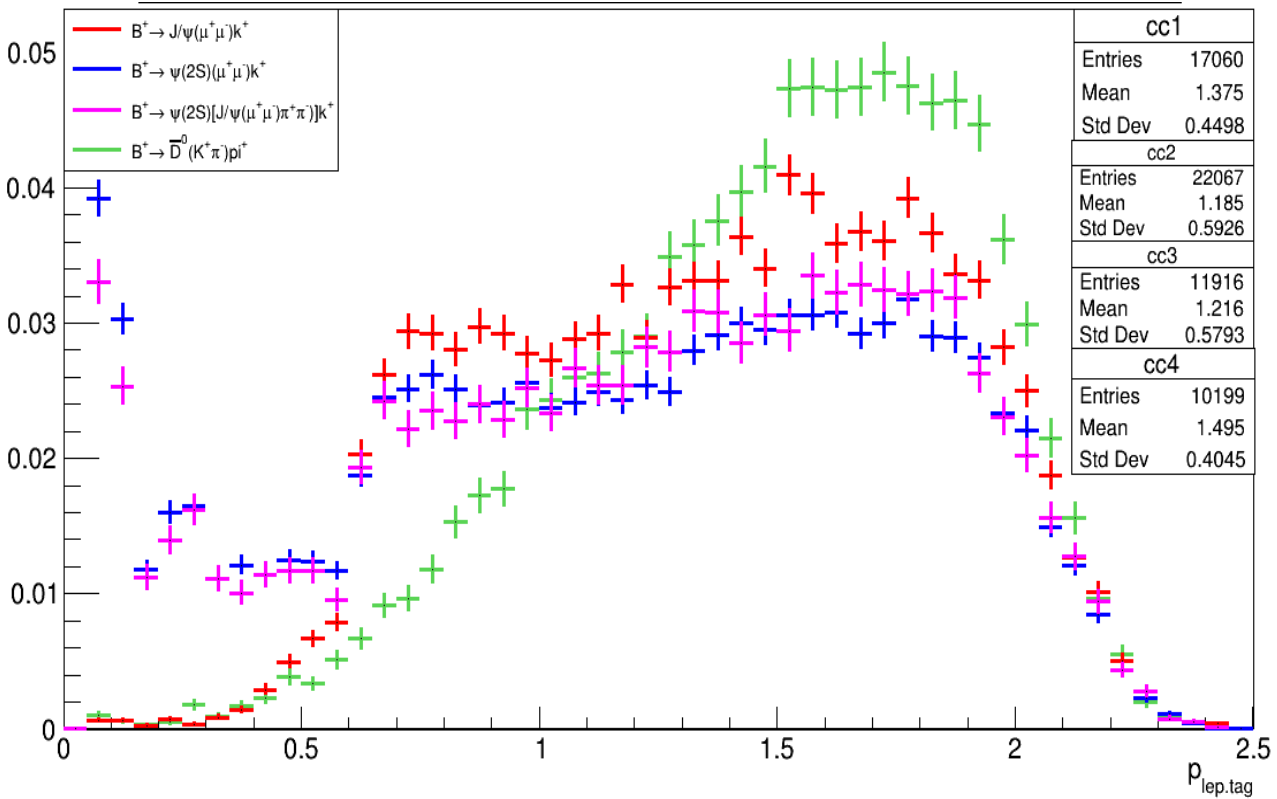
- Rank 1
- $M_{bc} > 5.27$ GeV
- $-0.050 < \Delta E < 0.050$ GeV
- abs(sin_phi) < 1.2
- $1.83 < m_D < 1.89$ GeV
- $1.7 < m_{hadROE} < 2.2$, $3.646 < m_{Psi(2S)} < 3.726$, $3.056 < m_{J/Psi} < 3.136$ GeV



$P_{lep.tag}$

Cuts applied

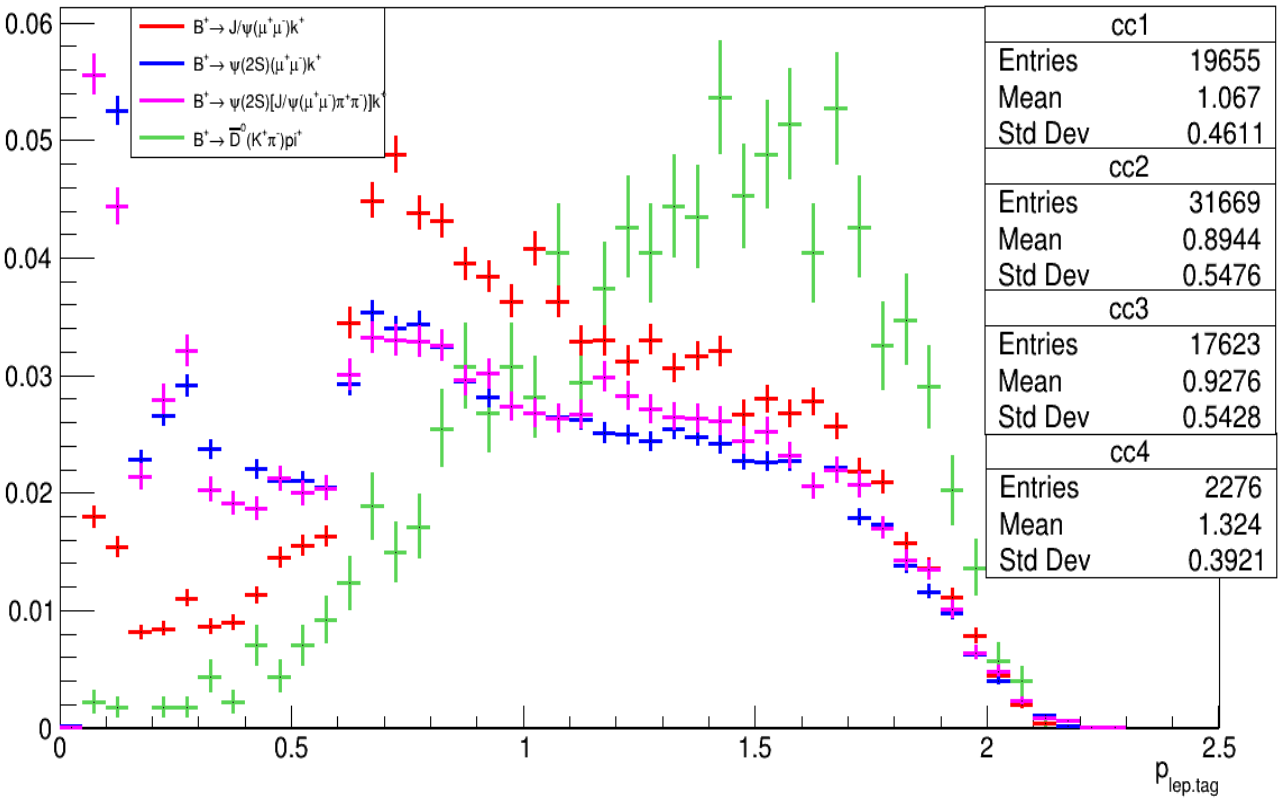
- Rank 1
- $M_{bc} > 5.27$ GeV
- $-0.050 < \Delta E < 0.050$ GeV
- abs(sin_phi) < 1.2
- **abs(cos(p_{Btag},p_{vistag})) < 1.0**
- $1.83 < m_D < 1.89$ GeV
- $1.7 < m_{hadROE} < 2.2$, $3.646 < m_{Psi(2S)} < 3.726$, $3.056 < m_{J/Psi} < 3.136$ GeV



$P_{lep.tag}$

Cuts applied

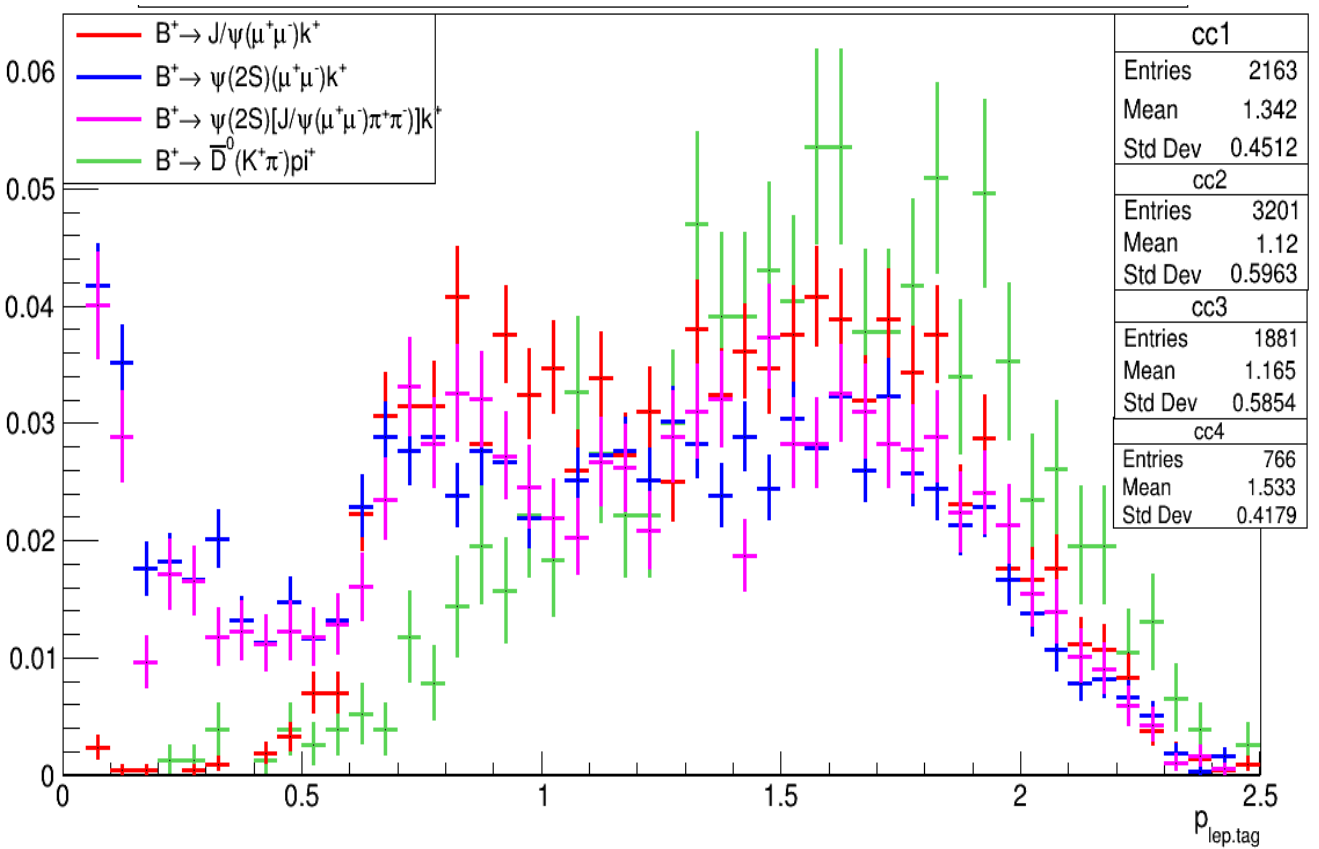
- Rank 1
- $M_{bc} > 5.27$ GeV
- $-0.050 < \Delta E < 0.050$ GeV
- abs(sin_phi) < 1.2
- **$\cos(p_{Btag}, p_{vistag}) < -1.0$**
- $1.83 < m_D < 1.89$ GeV
- $1.7 < m_{hadROE} < 2.2$, $3.646 < m_{Psi(2S)} < 3.726$, $3.056 < m_{J/Psi} < 3.136$ GeV



$P_{lep.tag}$

Cuts applied

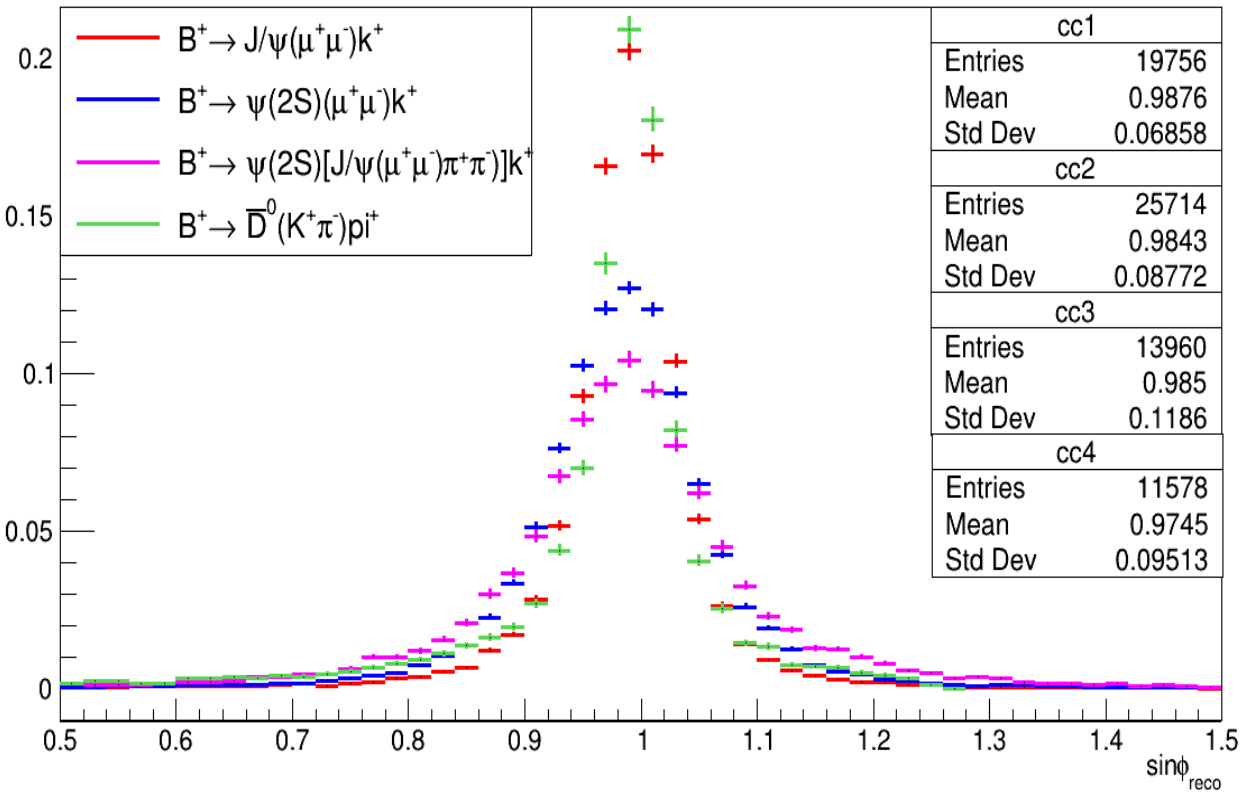
- Rank 1
- M_{bc} > 5.27 GeV
- -0.050 < ΔE < 0.050 GeV
- abs(sin_phi) < 1.2
- **cos(p_{Btag},p_{vistag}) > 1.0**
- 1.83 < m_D < 1.89 GeV
- 1.7 < m_{hadROE} < 2.2 , 3.646 < $m_{Psi(2S)}$ < 3.726 , 3.056 < $m_{J/Psi}$ < 3.136 GeV



Sin_phi$_{reco}$

Cuts applied

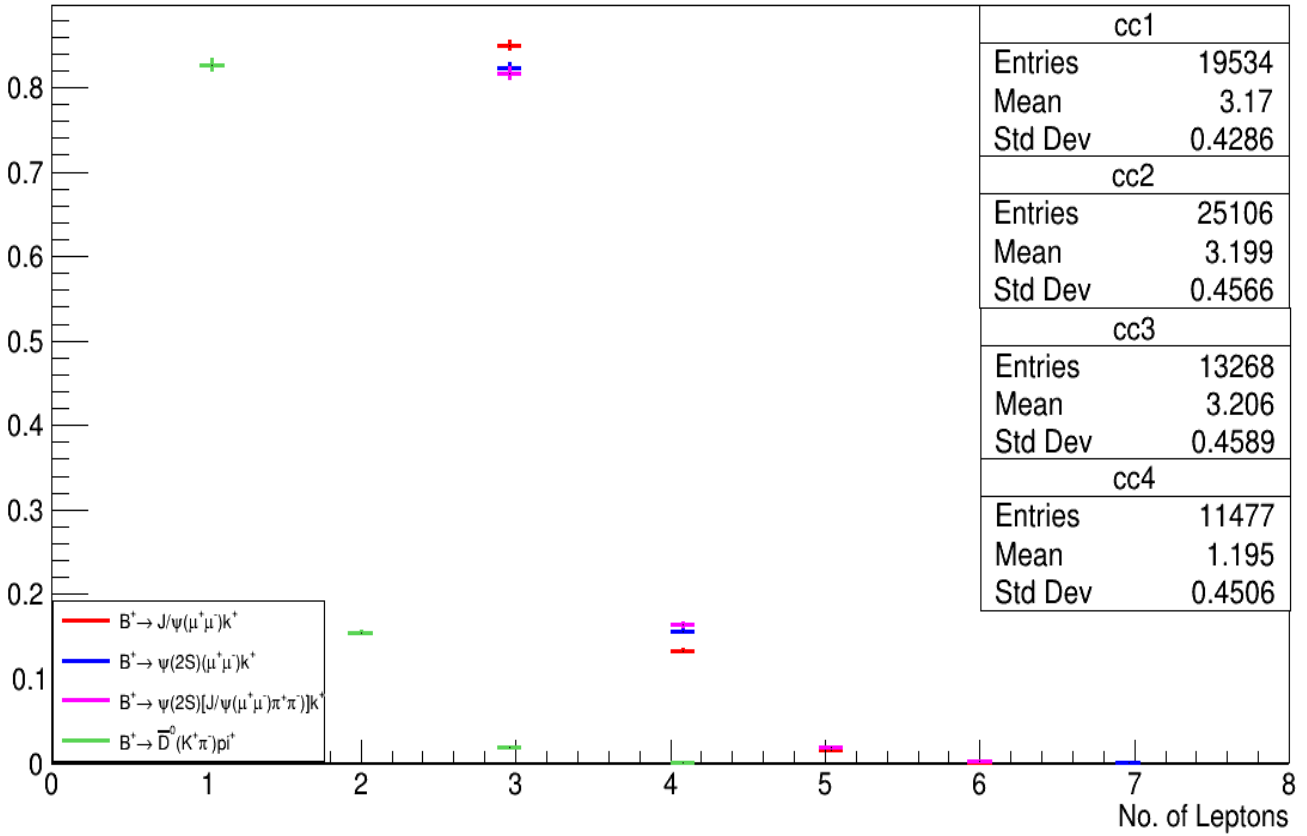
- Rank 1
- M_{bc} > 5.27 GeV
- -0.050 < ΔE < 0.050 GeV
- abs(cos(p_{Btag},p_{vistag})) < 1.0
- 1.83 < m_D < 1.89 GeV
- 1.7 < m_{hadROE} < 2.2 , 3.646 < $m_{Psi(2S)}$ < 3.726 , 3.056 < $m_{J/Psi}$ < 3.136 GeV



Number of leptons

Cuts applied

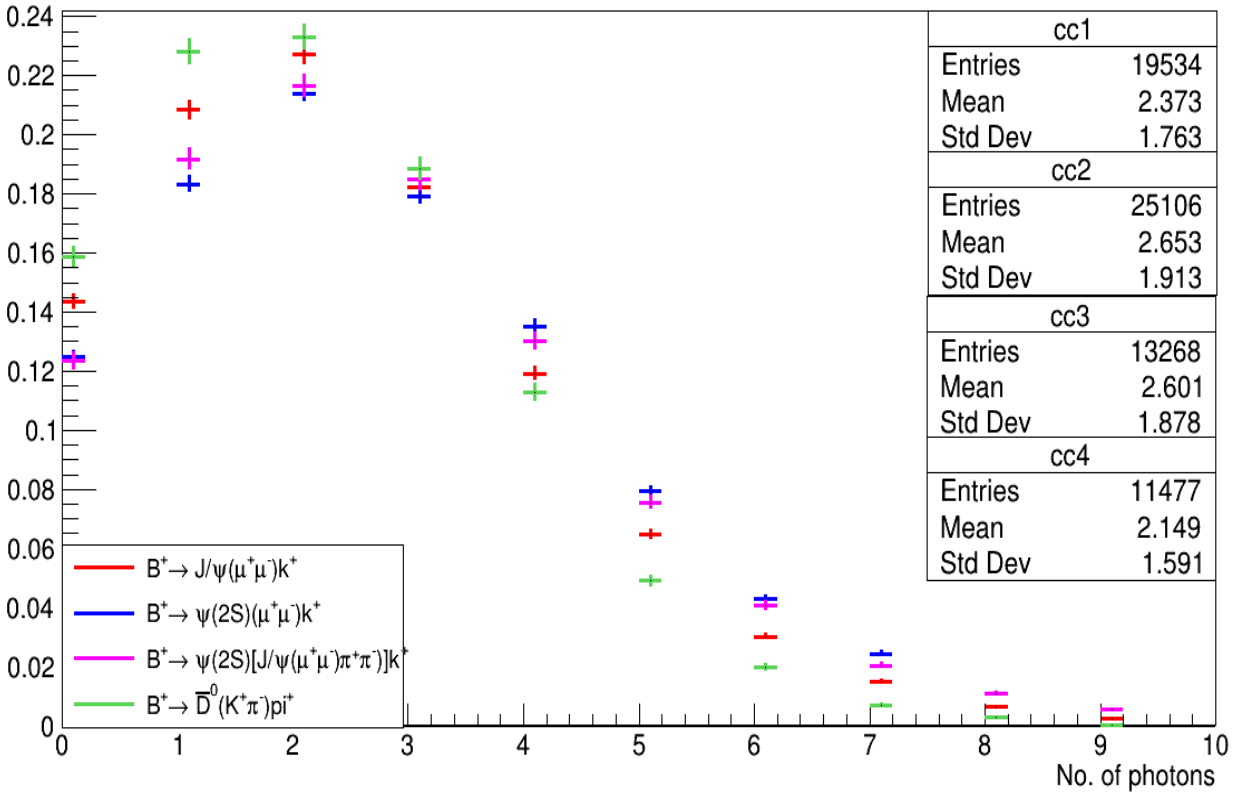
- Rank 1
- $M_{bc} > 5.27$ GeV
- $-0.050 < \Delta E < 0.050$ GeV
- abs(sin_phi) < 1.2
- $abs(cos(p_{Btag}, p_{vistag})) < 1.25$
- $1.83 < m_D < 1.89$ GeV
- $1.7 < m_{hadROE} < 2.2$, $3.646 < m_{Psi(2S)} < 3.726$, $3.056 < m_{J/Psi} < 3.136$ GeV



Number of photons

Cuts applied

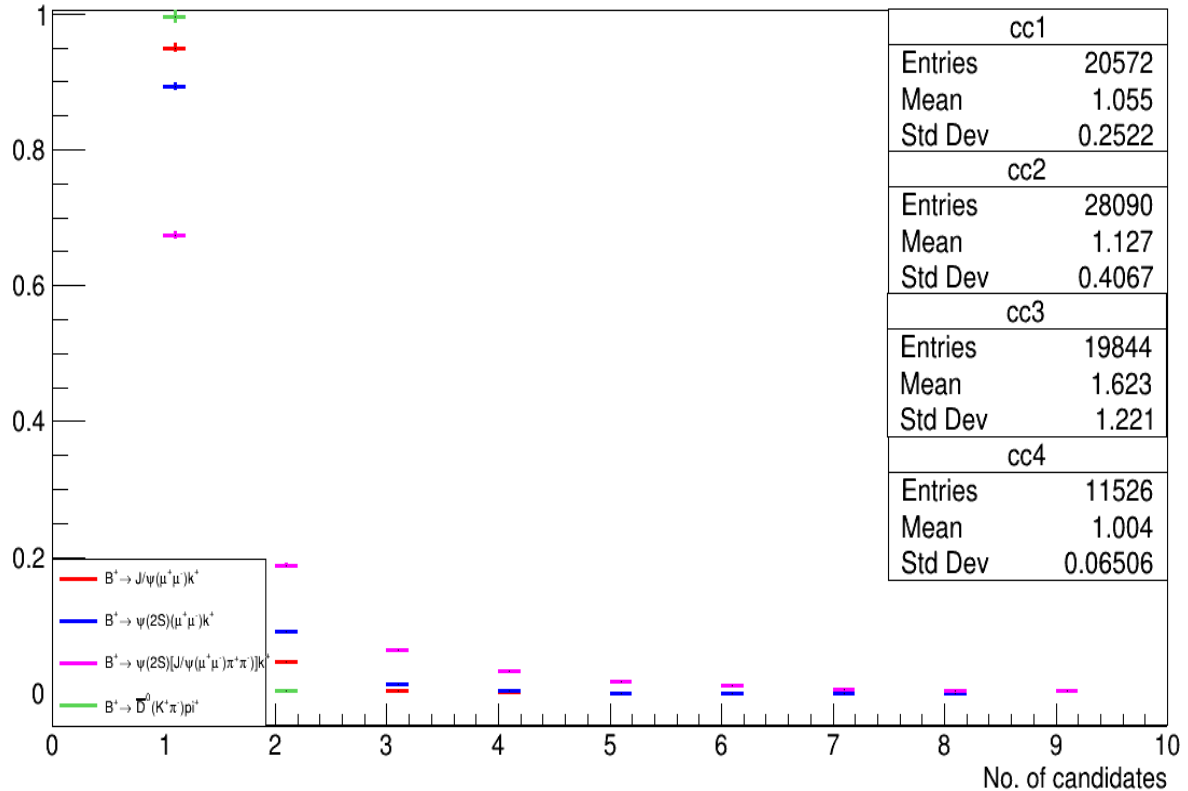
- Rank 1
- M_{bc} > 5.27 GeV
- -0.050 < ΔE < 0.050 GeV
- abs(sin_phi) < 1.2
- abs(cos(p_{Btag},p_{vistag})) < 1.25
- 1.83 < m_D < 1.89 GeV
- 1.7 < m_{hadROE} < 2.2 , 3.646 < $m_{Psi(2S)}$ < 3.726 , 3.056 < $m_{J/Psi}$ < 3.136 GeV



Number of candidates

Cuts applied

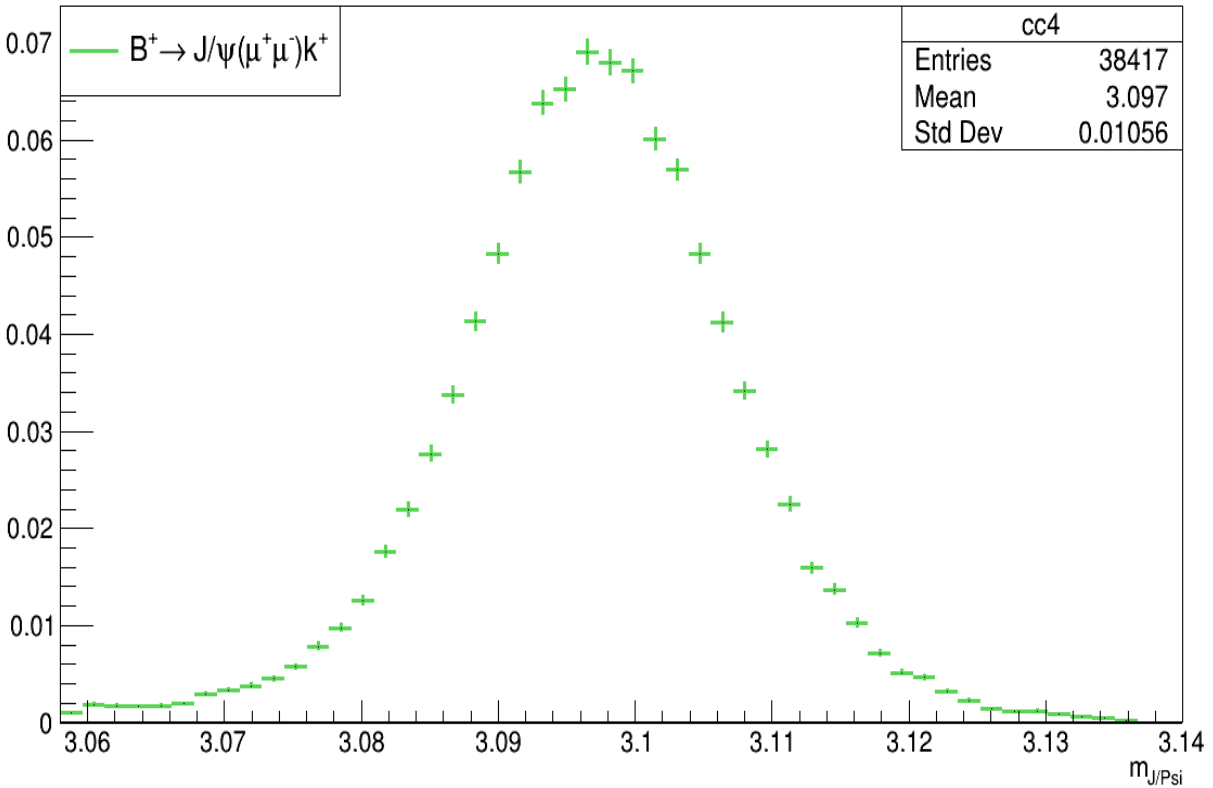
- $M_{bc} > 5.27$ GeV
- $-0.050 < \Delta E < 0.050$ GeV
- abs(sin_phi) < 1.2
- $abs(cos(p_{Btag}, p_{vistag})) < 1.25$
- $1.83 < m_D < 1.89$ GeV
- $1.7 < m_{hadROE} < 2.2$, $3.646 < m_{Psi(2S)} < 3.726$, $3.056 < m_{J/Psi} < 3.136$ GeV



$m_{J/Psi}$

Cuts applied

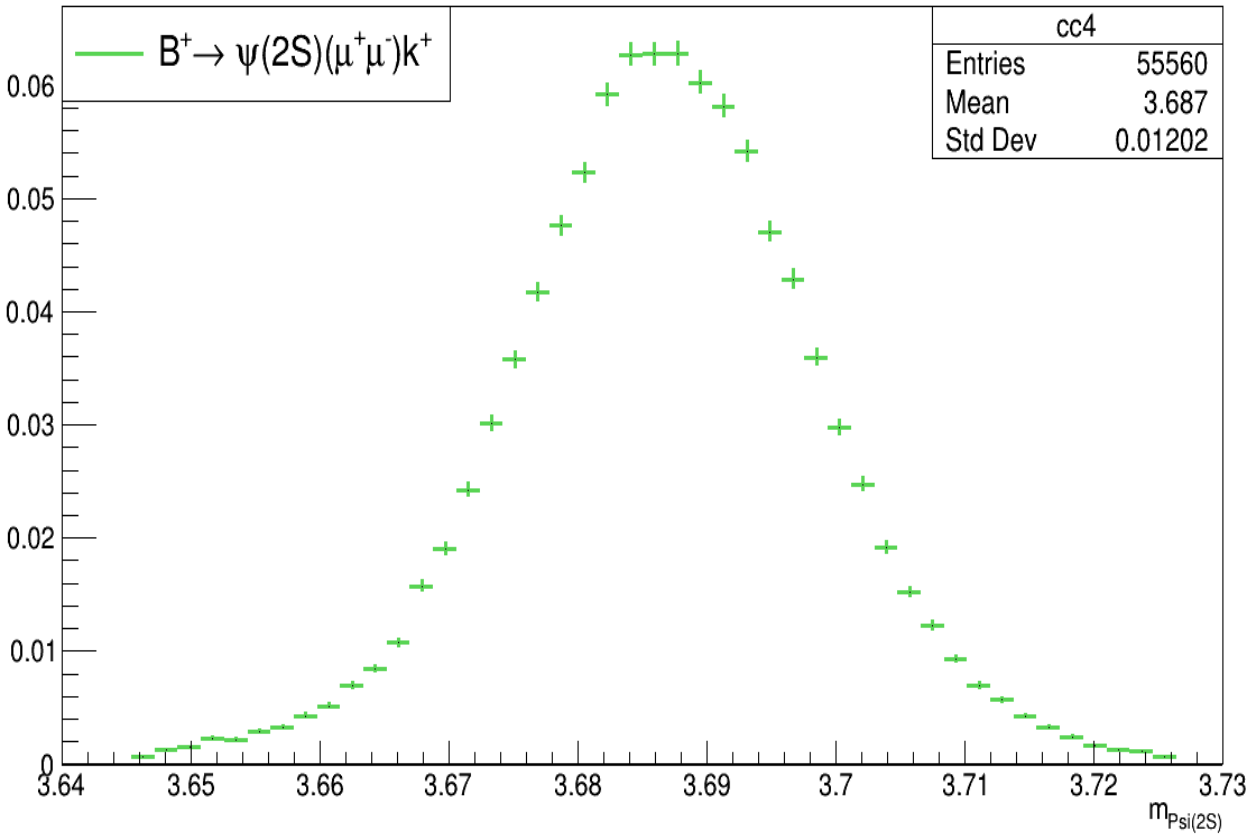
- Rank 1
- $M_{bc} > 5.27$ GeV
- $-0.050 < \Delta E < 0.050$ GeV
- abs(sin_phi) < 1.2
- $abs(cos(p_{Btag}, p_{vistag})) < 1.25$
- $3.056 < m_{J/Psi} < 3.136$ GeV
- $1.7 < m_{hadROE} < 2.2$ GeV



$m_{Psi(2S)}$

Cuts applied

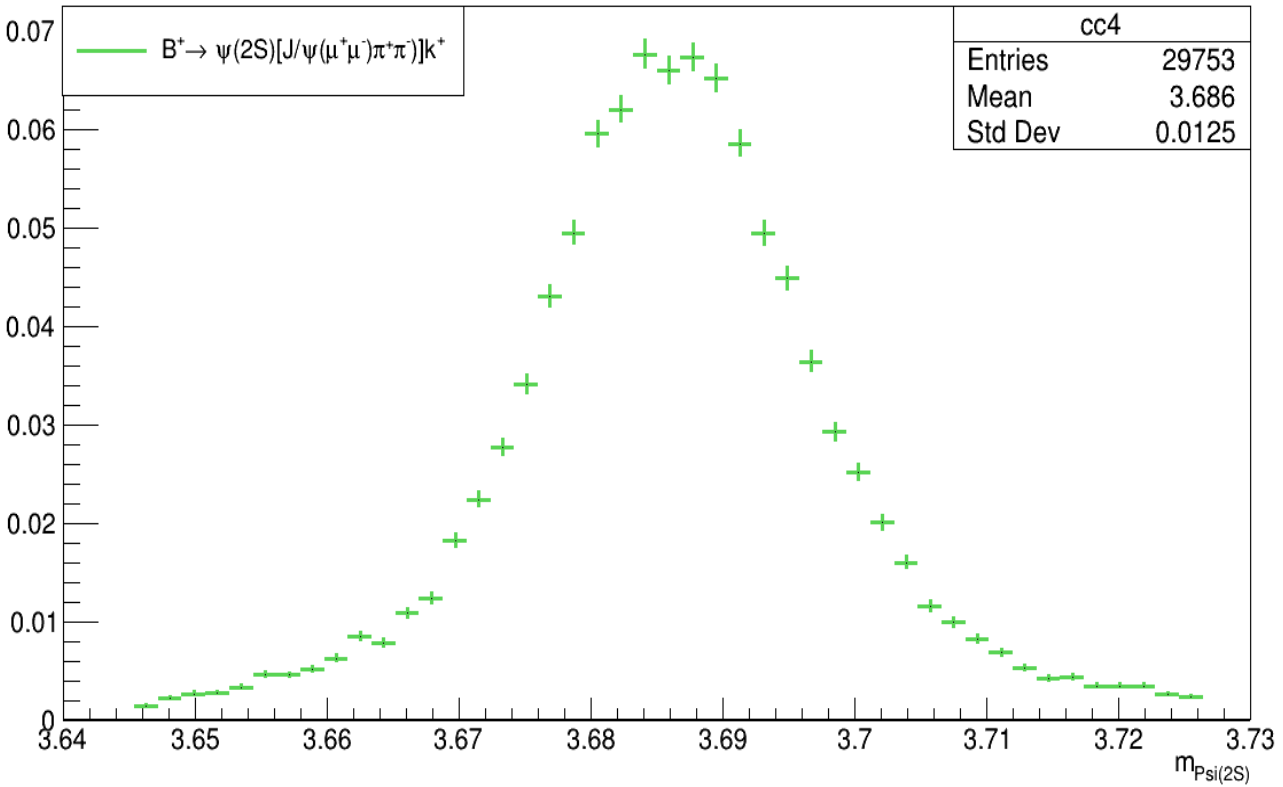
- Rank 1
- $M_{bc} > 5.27$ GeV
- $-0.050 < \Delta E < 0.050$ GeV
- abs(sin_phi) < 1.2
- $abs(cos(p_{Btag}, p_{vistag})) < 1.25$
- $3.646 < m_{Psi(2S)} < 3.726$ GeV
- $1.7 < m_{hadROE} < 2.2$ GeV



$m_{Psi(2S)}$

Cuts applied

- Rank 1
- $M_{bc} > 5.27$ GeV
- $-0.050 < \Delta E < 0.050$ GeV
- abs(sin_phi) < 1.2
- $abs(cos(p_{Btag}, p_{vistag})) < 1.25$
- $3.646 < m_{Psi(2S)} < 3.726$ GeV
- $1.7 < m_{hadROE} < 2.2$ GeV



m_{D0}

Cuts applied

- Rank 1
- $M_{bc} > 5.27$ GeV
- $-0.050 < \Delta E < 0.050$ GeV
- abs(sin_phi) < 1.2
- $abs(cos(p_{Btag}, p_{vistag})) < 1.25$
- $3.646 < m_{Psi(2S)} < 3.726$ GeV
- $1.7 < m_{hadROE} < 2.2$ GeV