

# Second control channel update

Complete Belle data set

$$B^+ \rightarrow \text{Psi}(2S) K^+$$

$$\text{Psi}(2S) \rightarrow \mu^+ \mu^-$$

15 April 2024

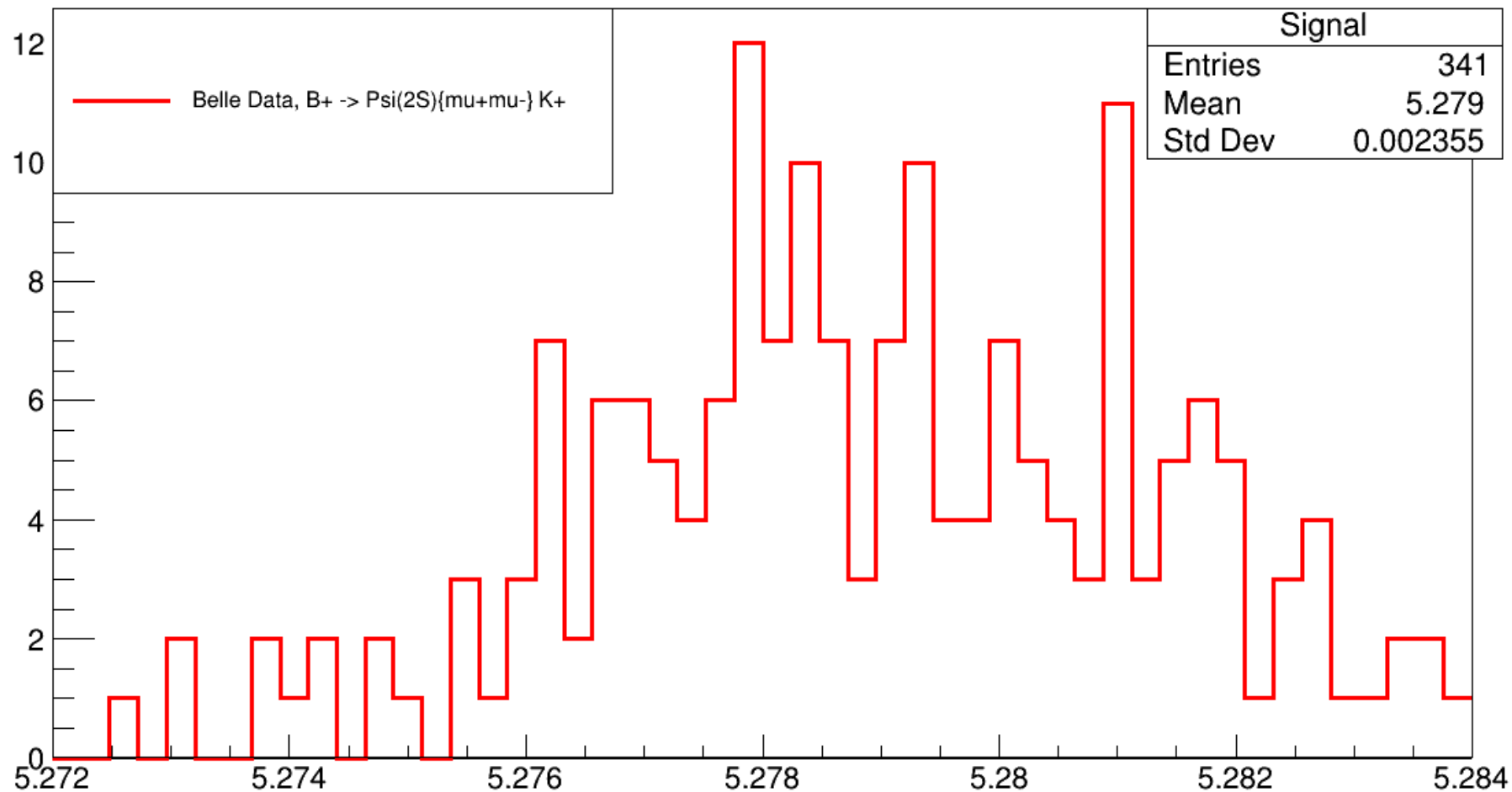
# Cuts in the reconstruction program

- MVA photon cuts.
- $1.3 < m_{\text{hadROE}} < 5.3 \text{ GeV}$

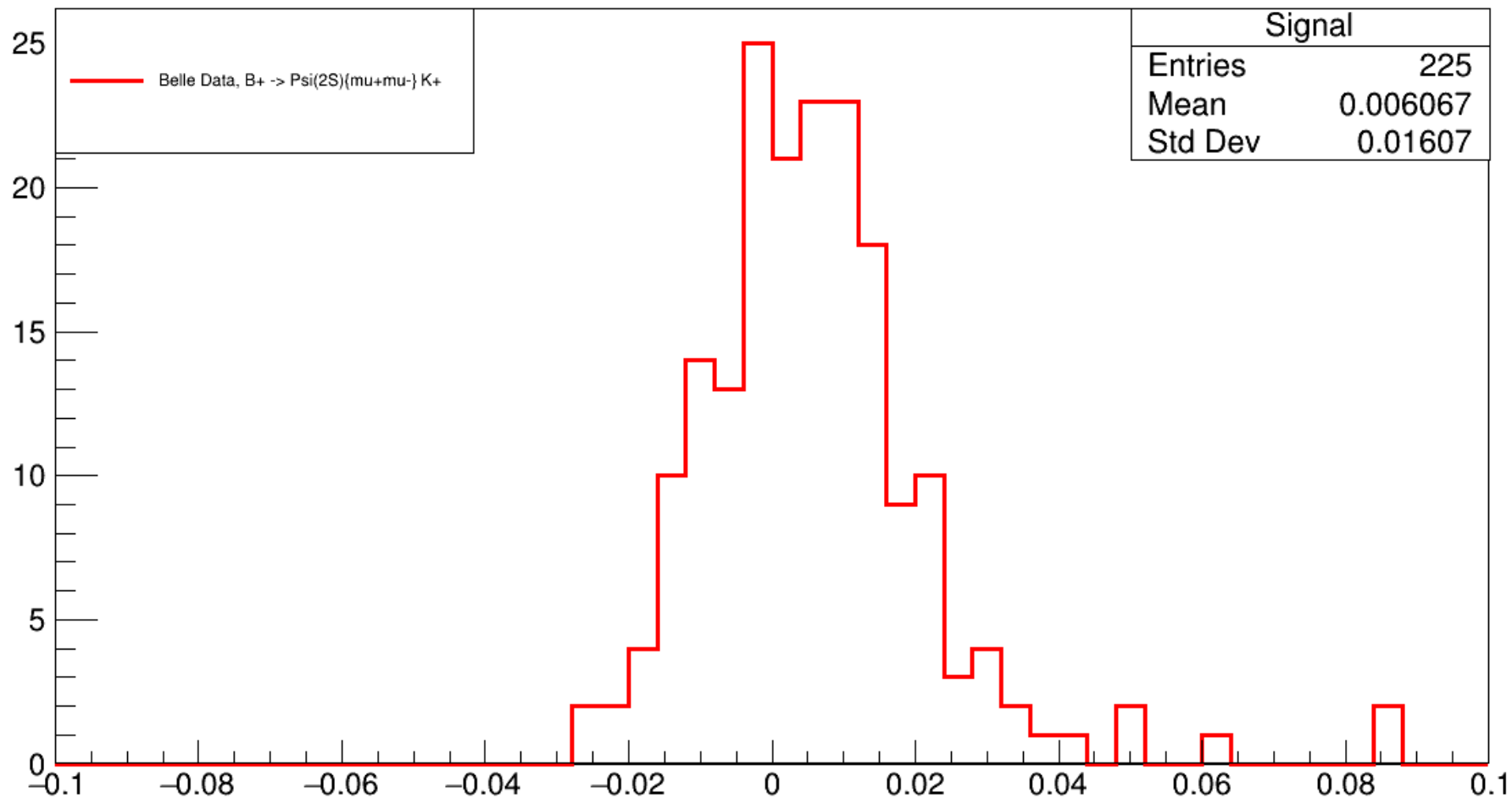
# Root level cuts

- All applied cuts are mentioned in the title of the plots.

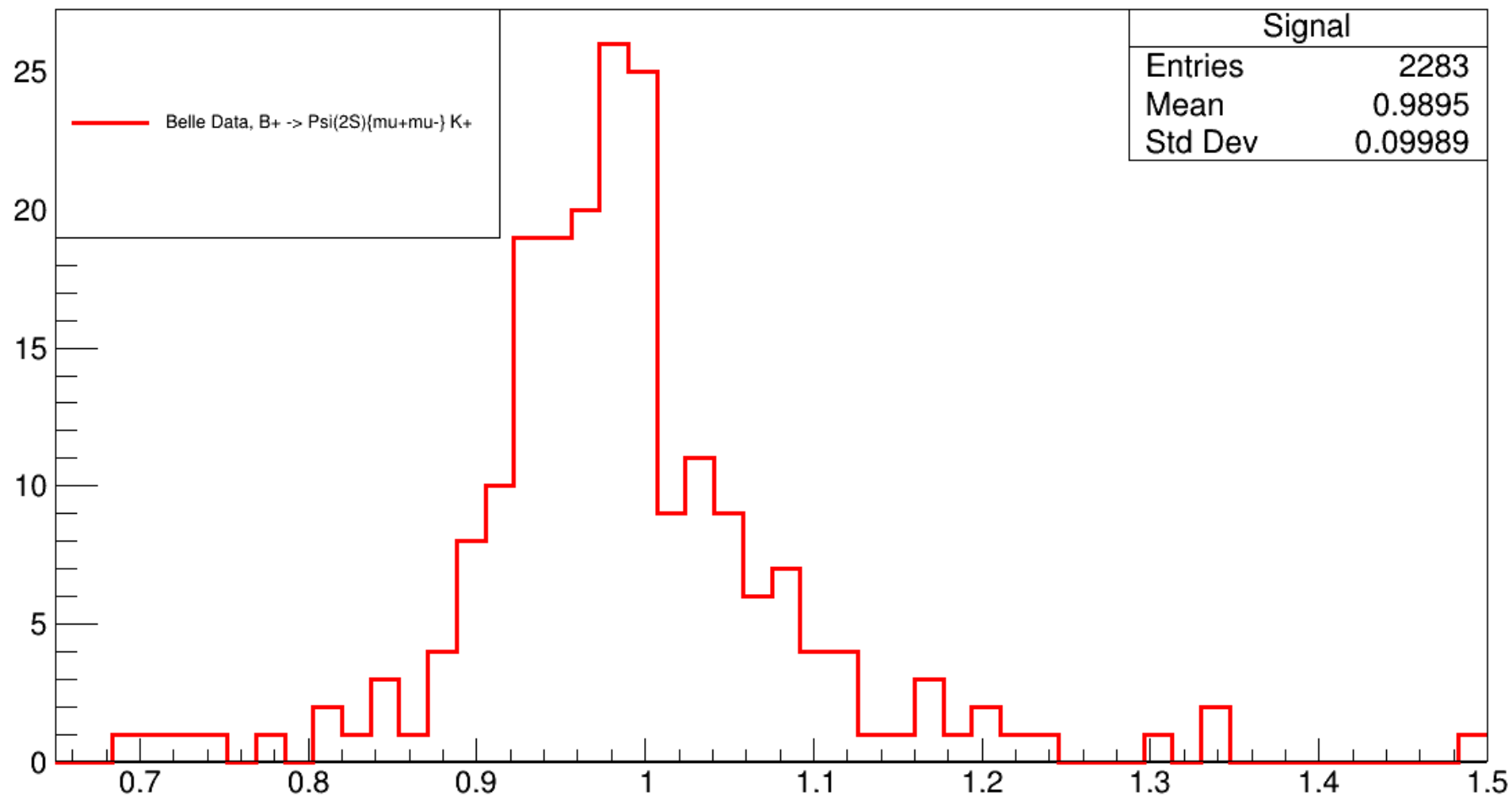
Mbc\_Bsig with rank 1,  $-0.050 < \Delta E_{\text{Bsig}} < 0.050$  and  $|\sin \phi| < 1.1$



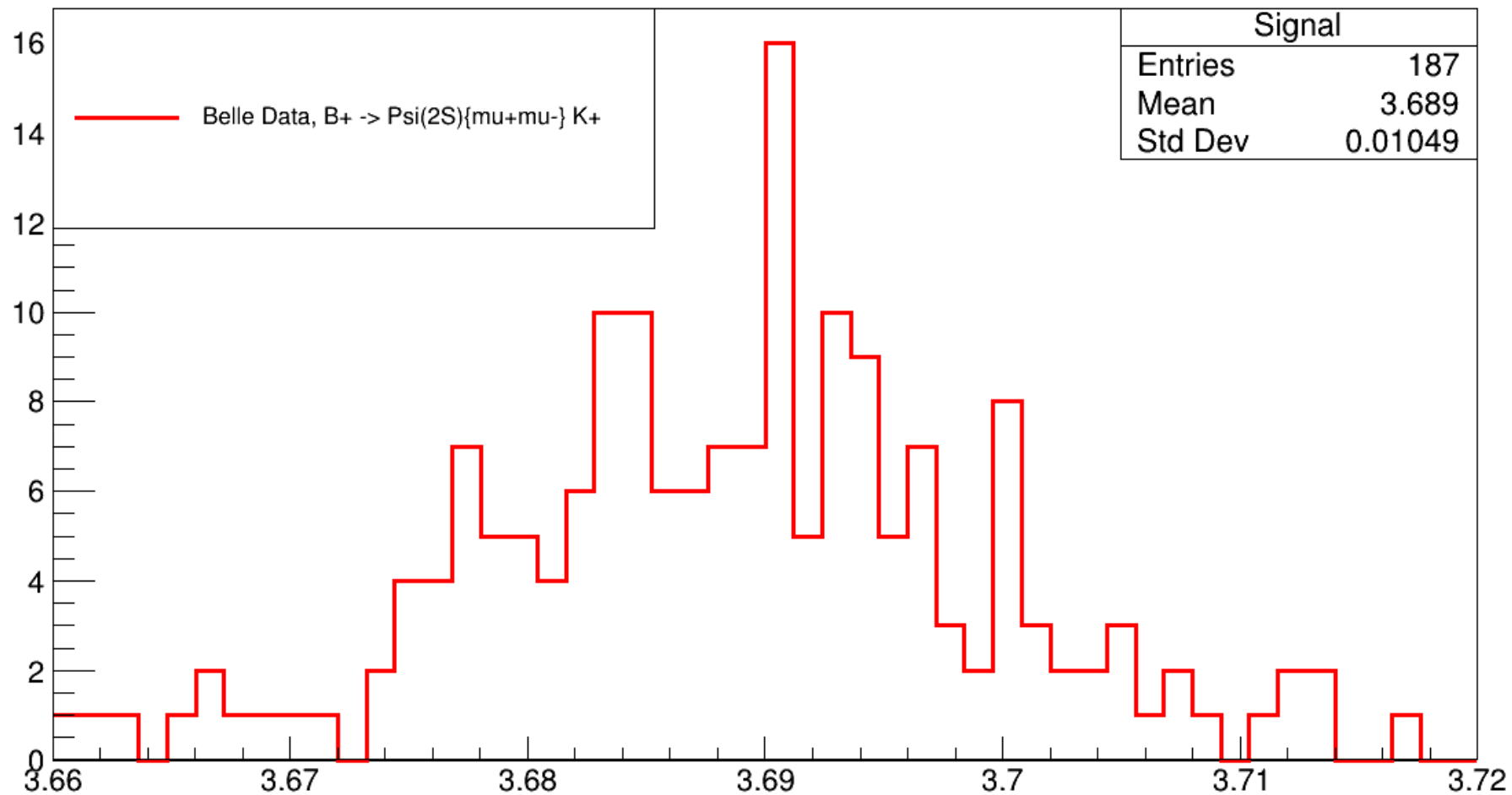
deltaE\_Bsig with rank 1, Mbc\_Bsig>5.27 and abs(sin\_phi)<1.1



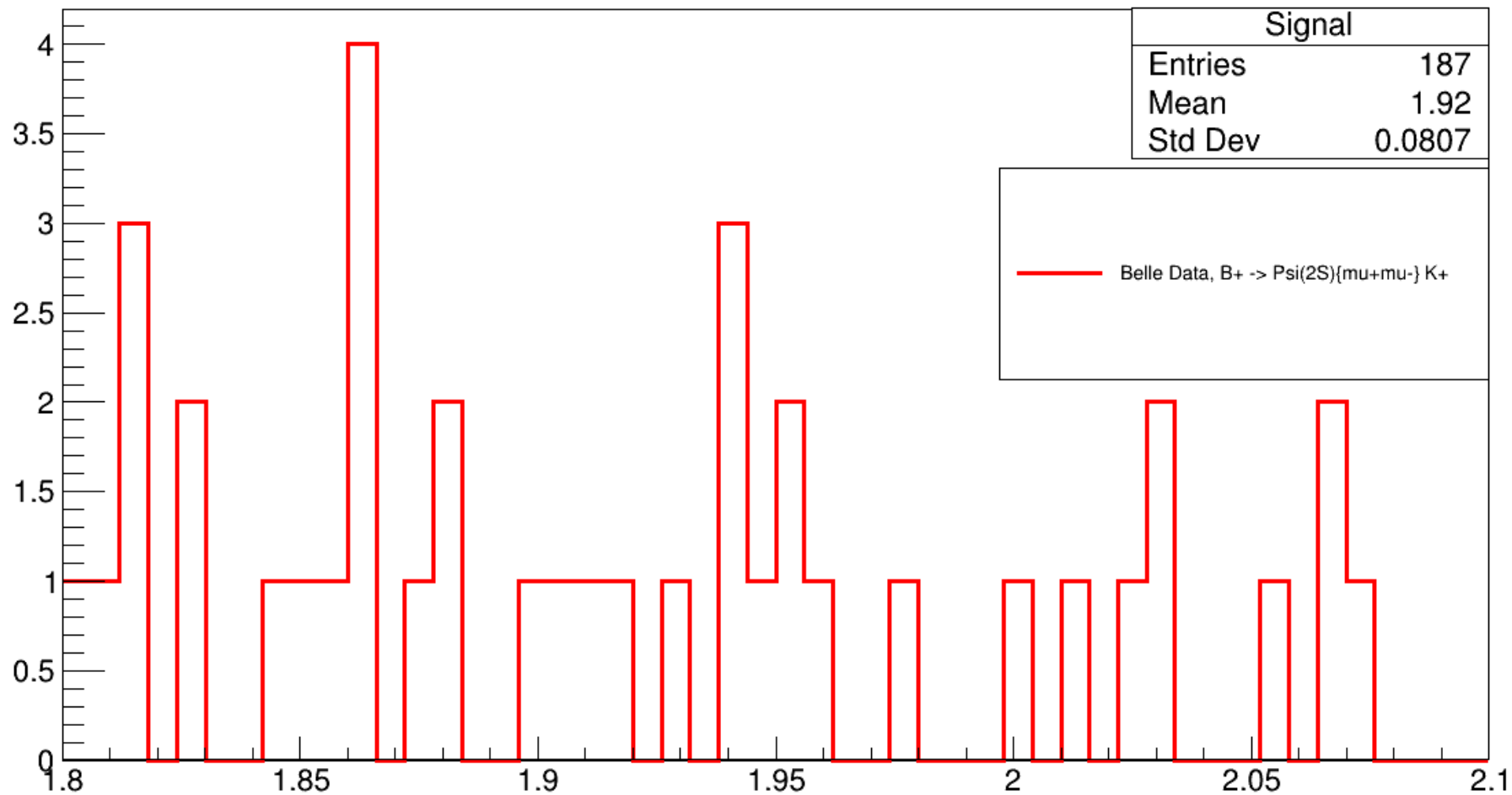
sin\_phi with rank 1,  $-0.050 < \Delta E_{Bsig} < 0.050$ ,  $M_{bc\_Bsig} > 5.27$



m(Psi(2S)) with rank 1,  $-0.050 < \Delta E_{\text{Bsig}} < 0.050$ ,  $M_{\text{bc\_Bsig}} > 5.27$  and  $|\sin \phi| < 1.1$

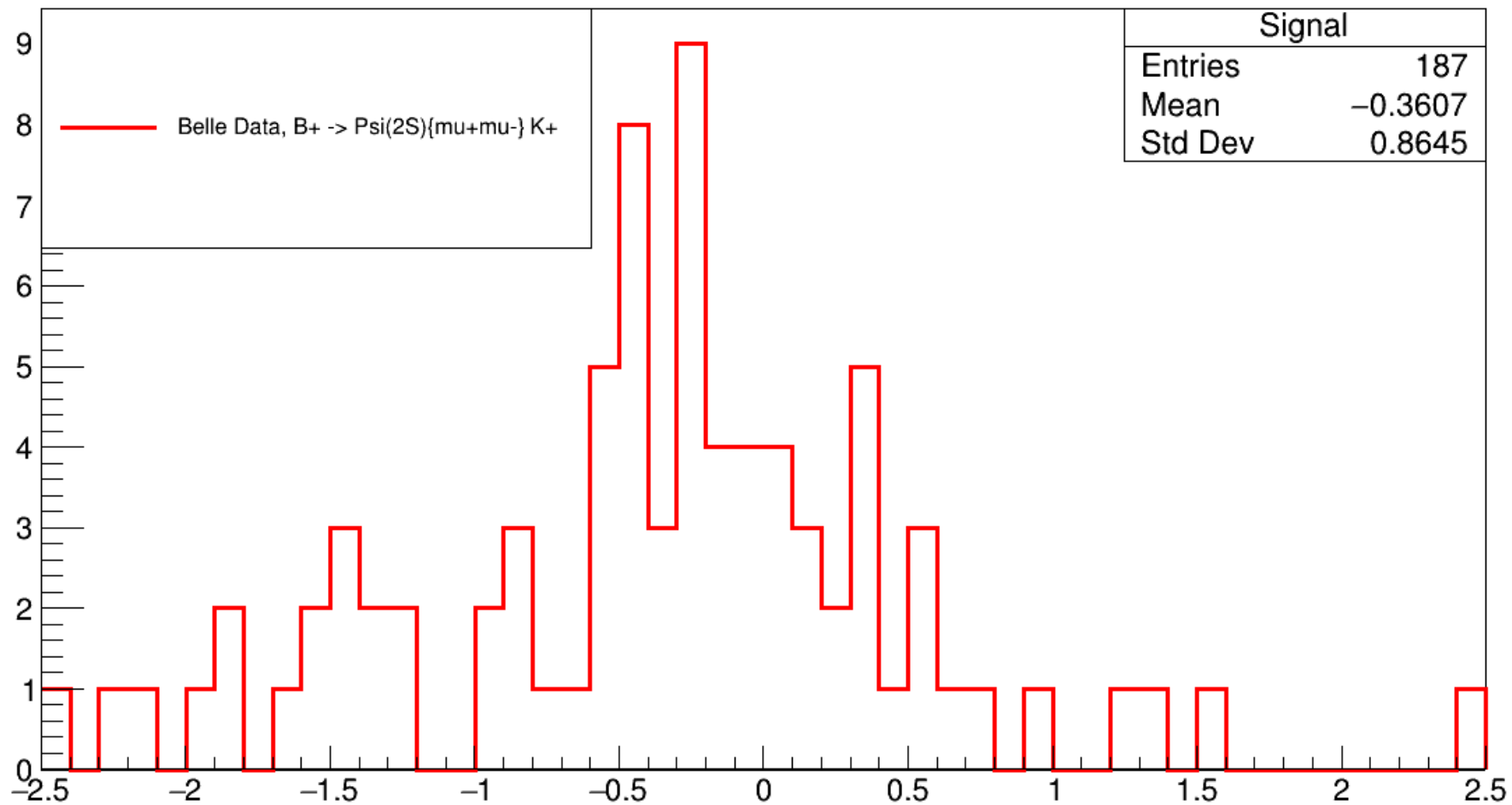


m\_hadROE with rank 1,  $-0.050 < \Delta E_{Bsig} < 0.050$ ,  $M_{bc\_Bsig} > 5.27$  and  $|\sin \phi| < 1.1$

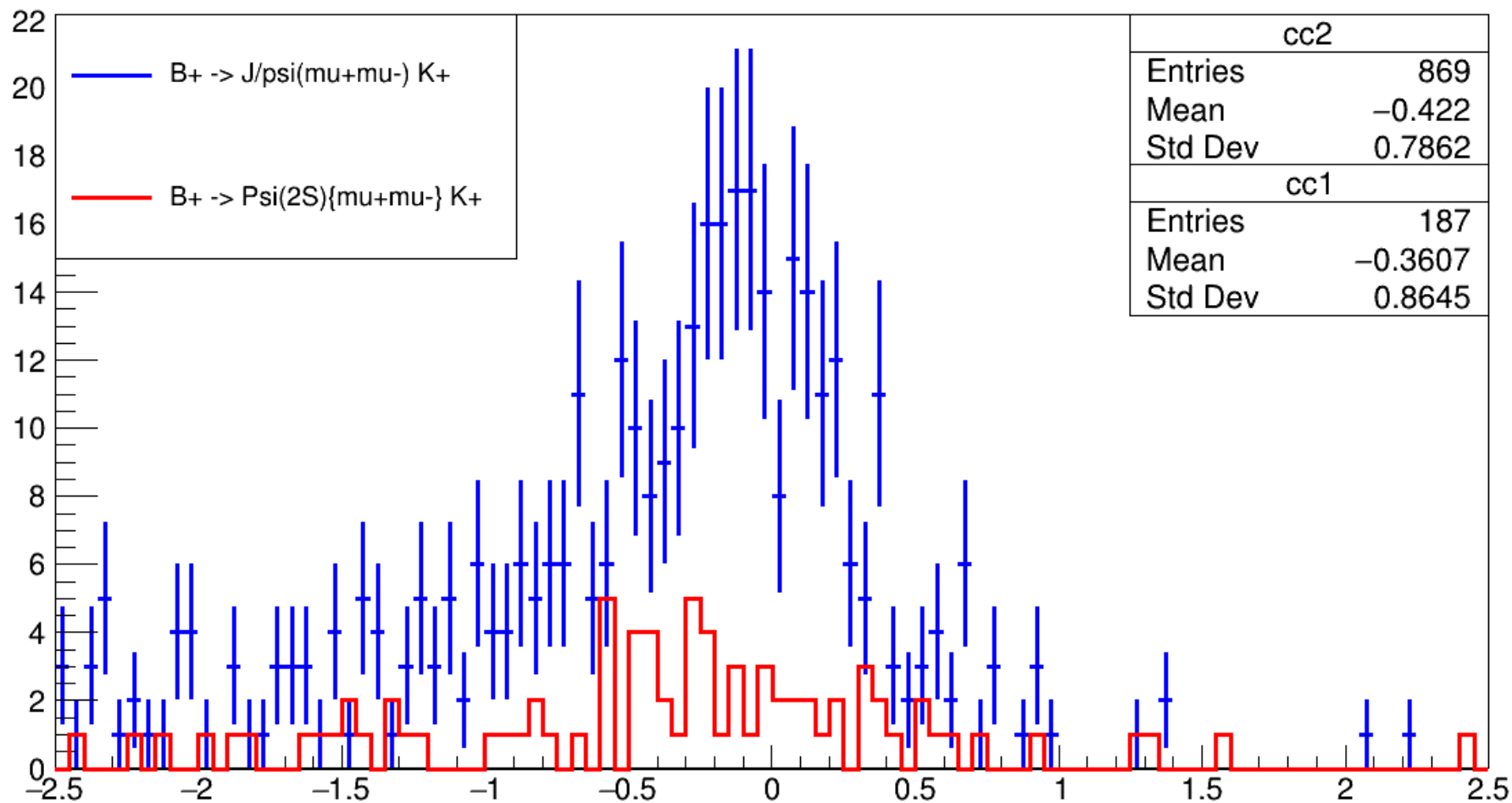




cos $\Delta\theta$  with rank 1,  $-0.050 < \Delta E_{\text{Bsig}} < 0.050$ ,  $M_{\text{bc}} > 5.27$  and  $|\sin\phi| < 1.1$



cos $\Delta\theta$  with Mbc\_Bsig>5.27,-0.050 < deltaE\_Bsig < 0.050, Rank 1, abs(sin\_phi)<1.1



# To do list

- Started working on

$$B^+ \rightarrow \text{Psi}(2S) K^+$$

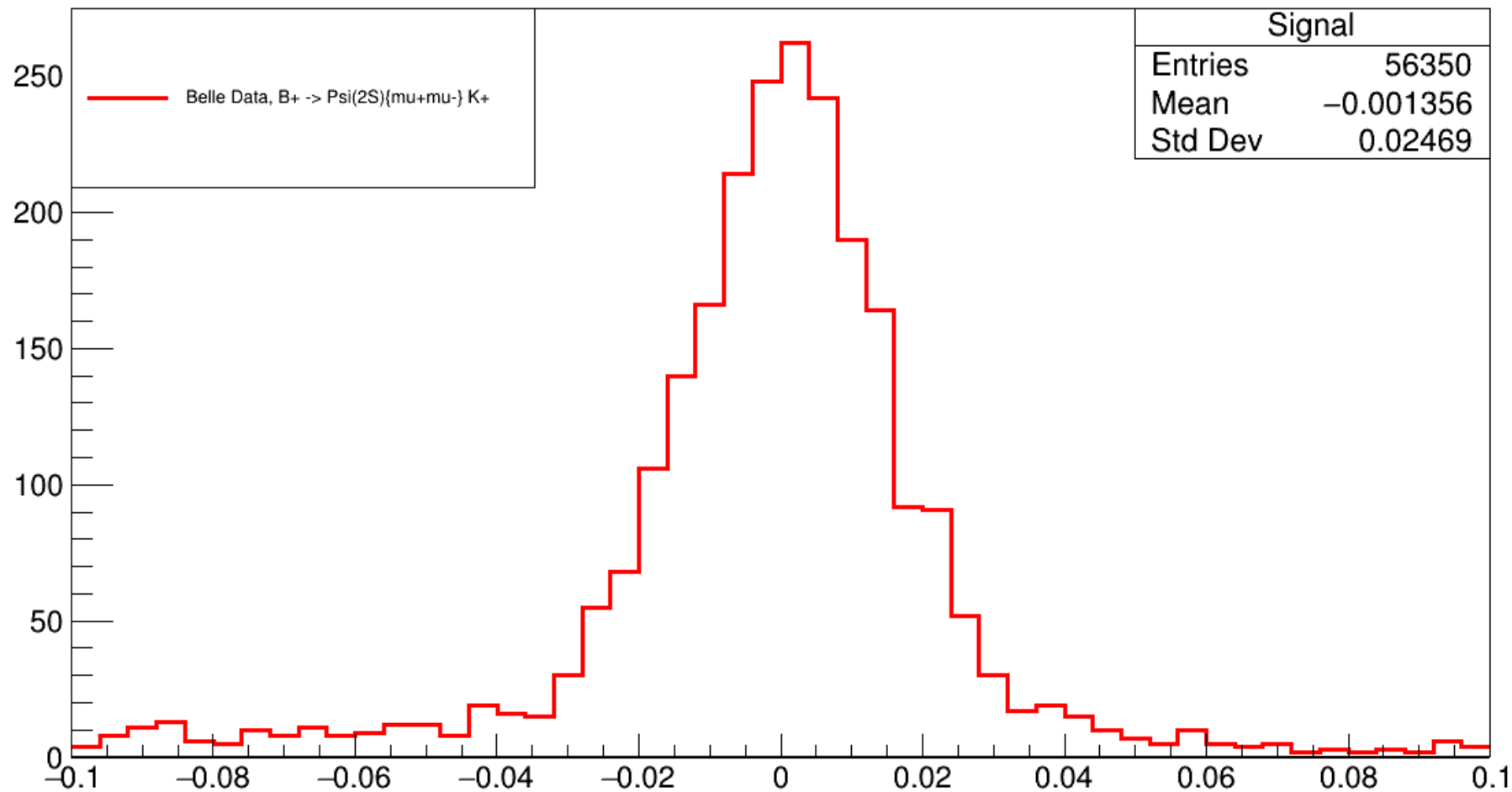
$$\text{Psi}(2S) \rightarrow J/\text{Psi} \pi^+ \pi^-$$

$$J/\text{Psi} \rightarrow \mu^+ \mu^-$$

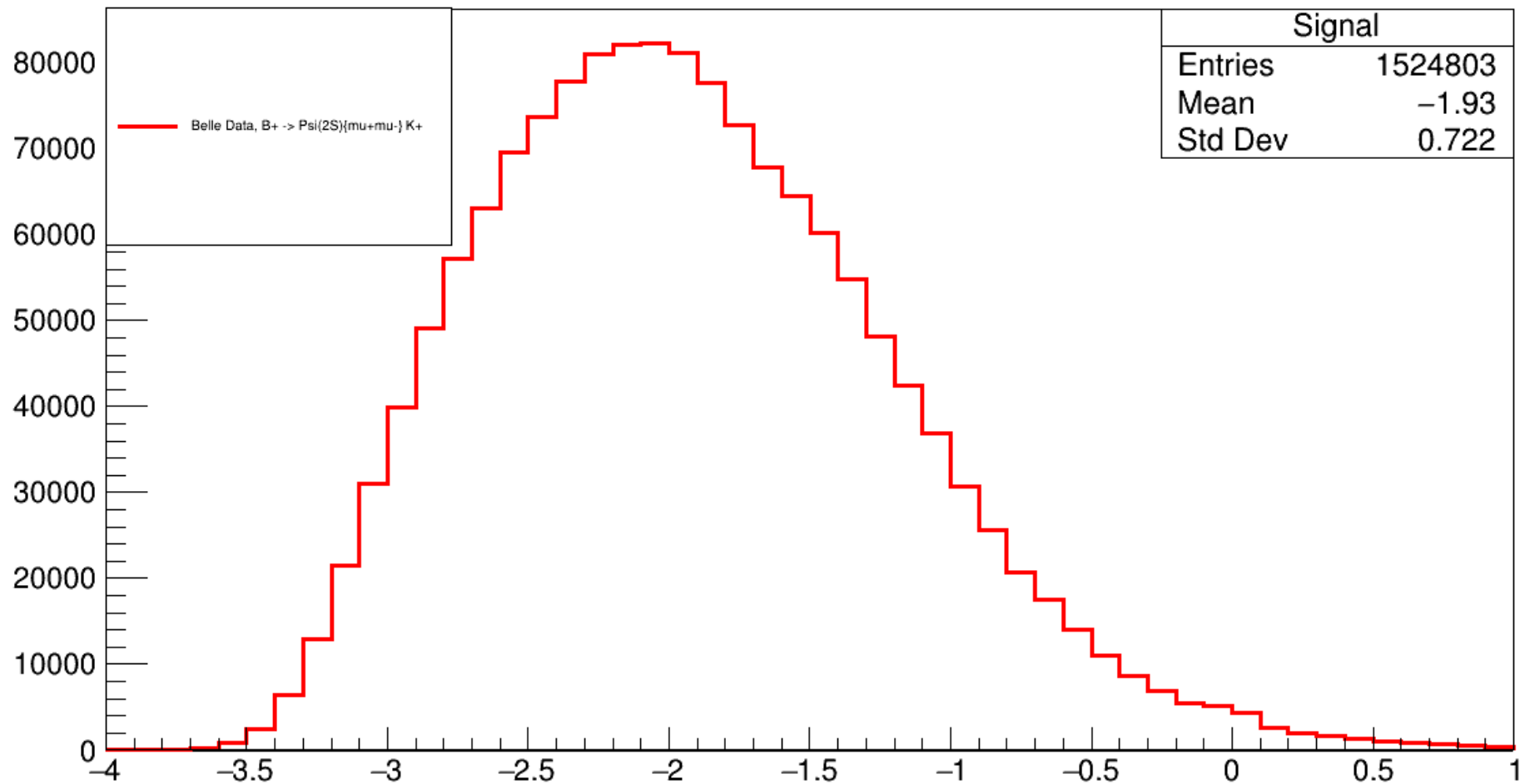
$$B^- \rightarrow \text{generic}$$

Back up

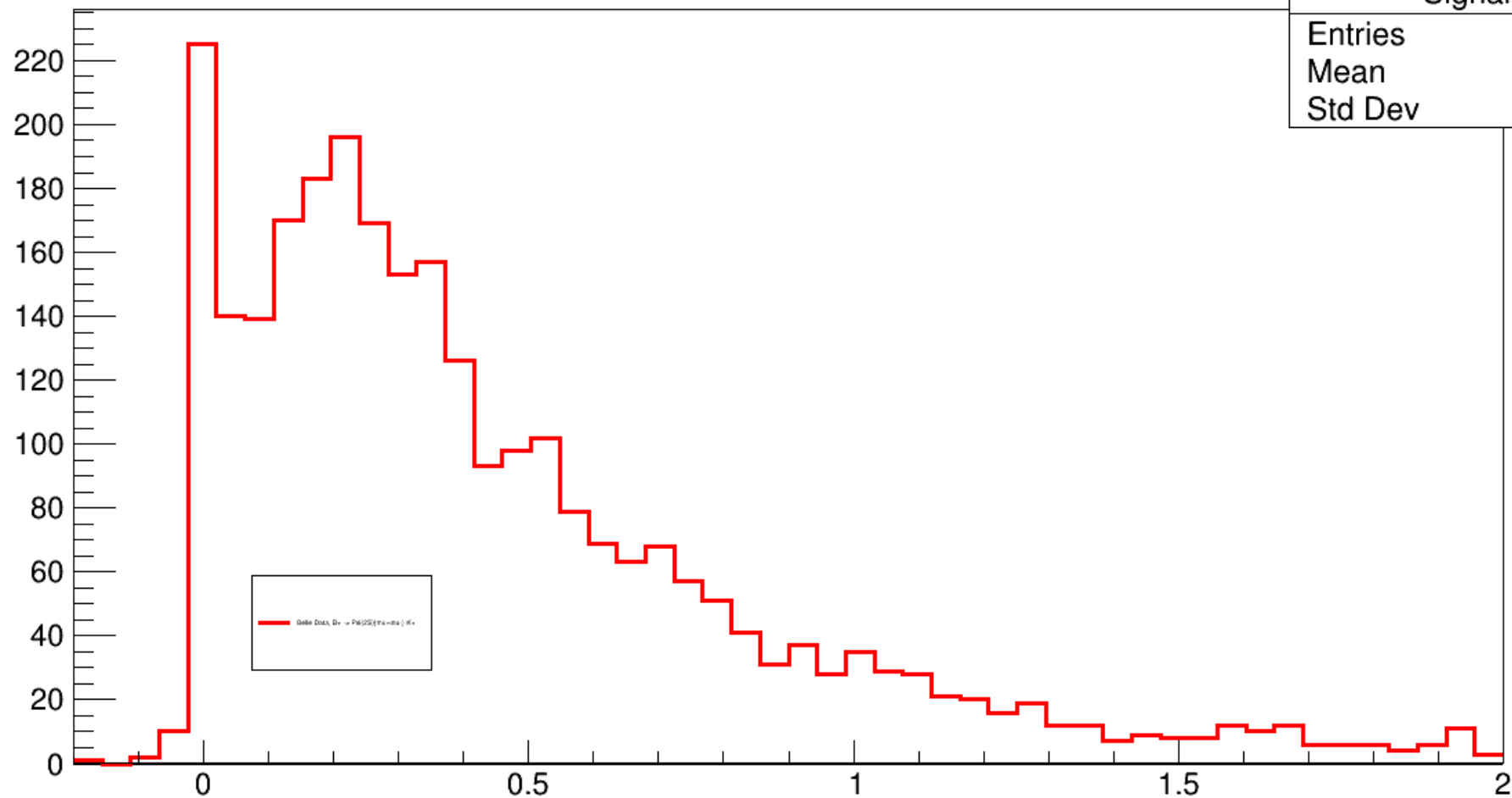
# deltaE\_Bsig with rank 1 and Mbc\_Bsig>5.27



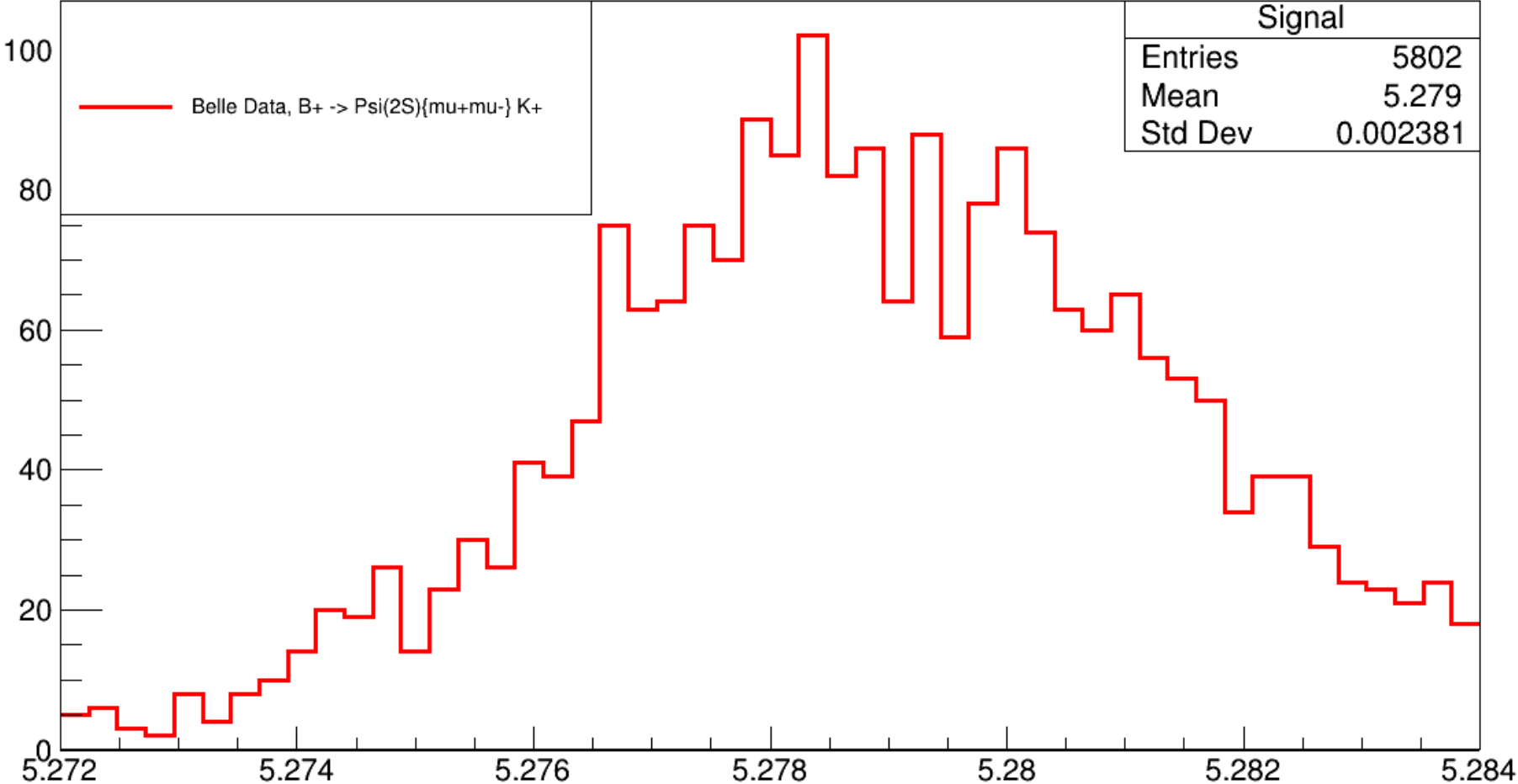
# deltaE\_Bsig with rank 1



deltaE\_Bsig with rank 1 and abs(sin\_phi)<1.1

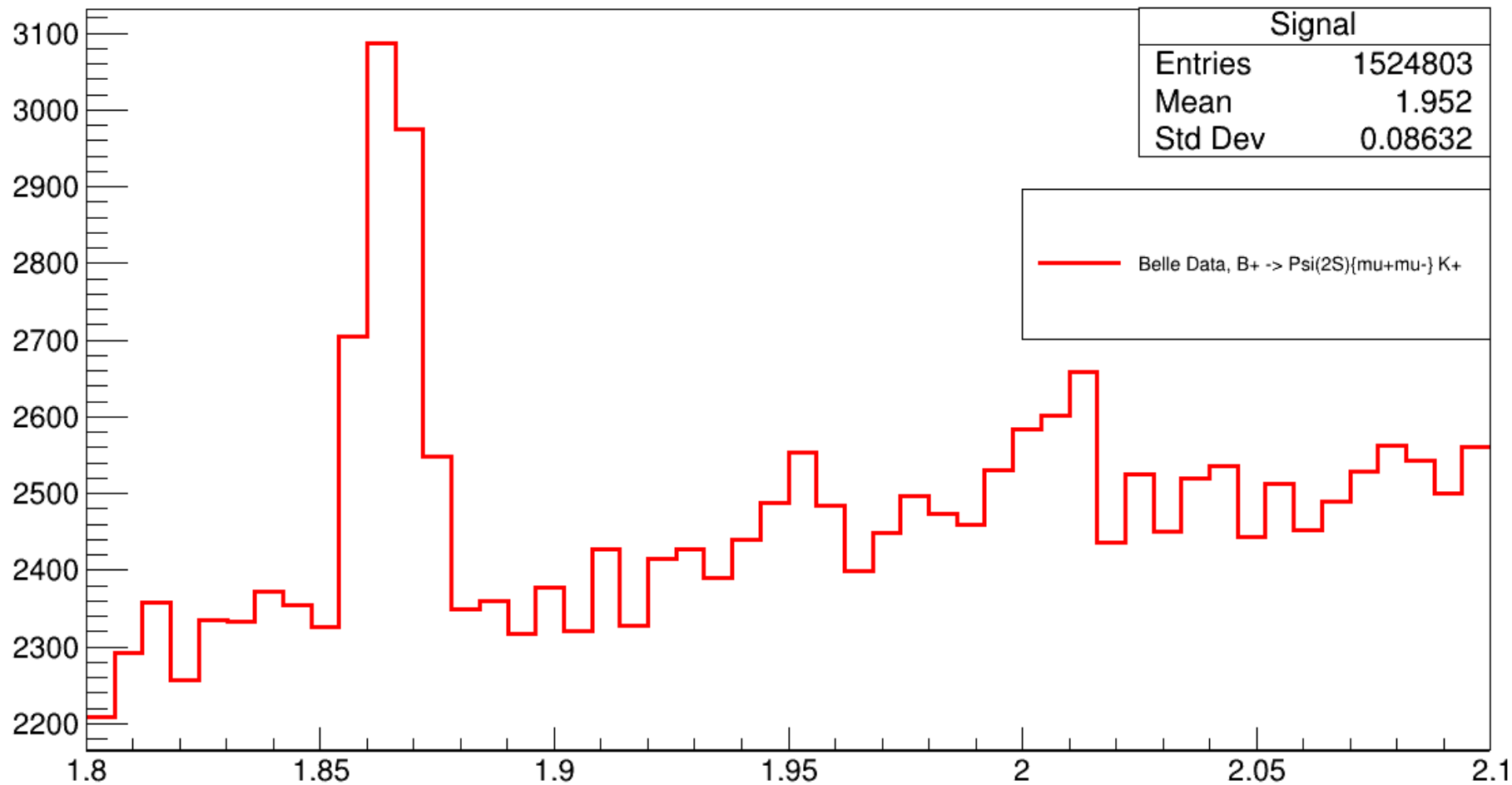


Mbc\_Bsig with rank 1 and  $-0.050 < \Delta E_{\text{Bsig}} < 0.050$

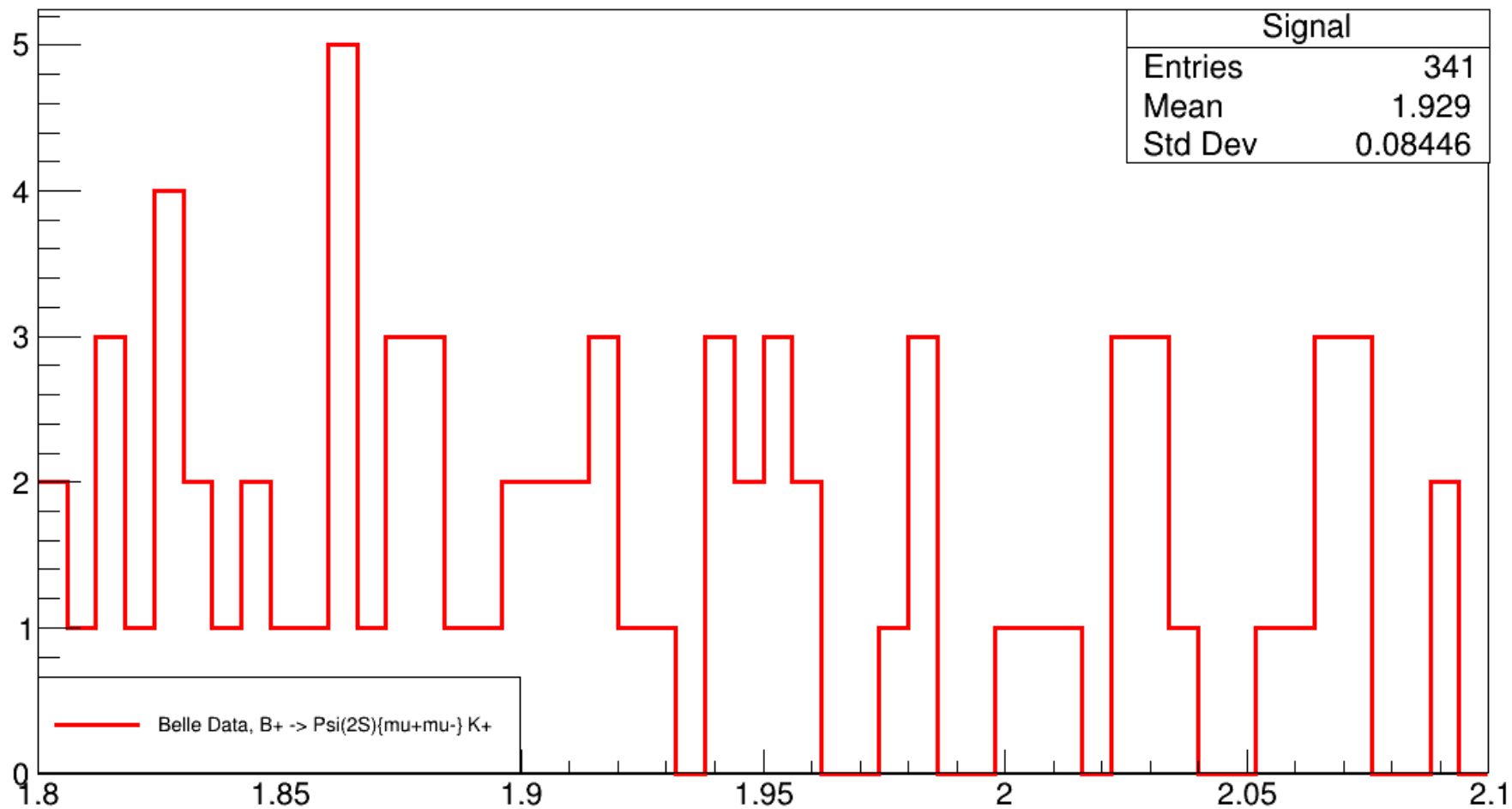




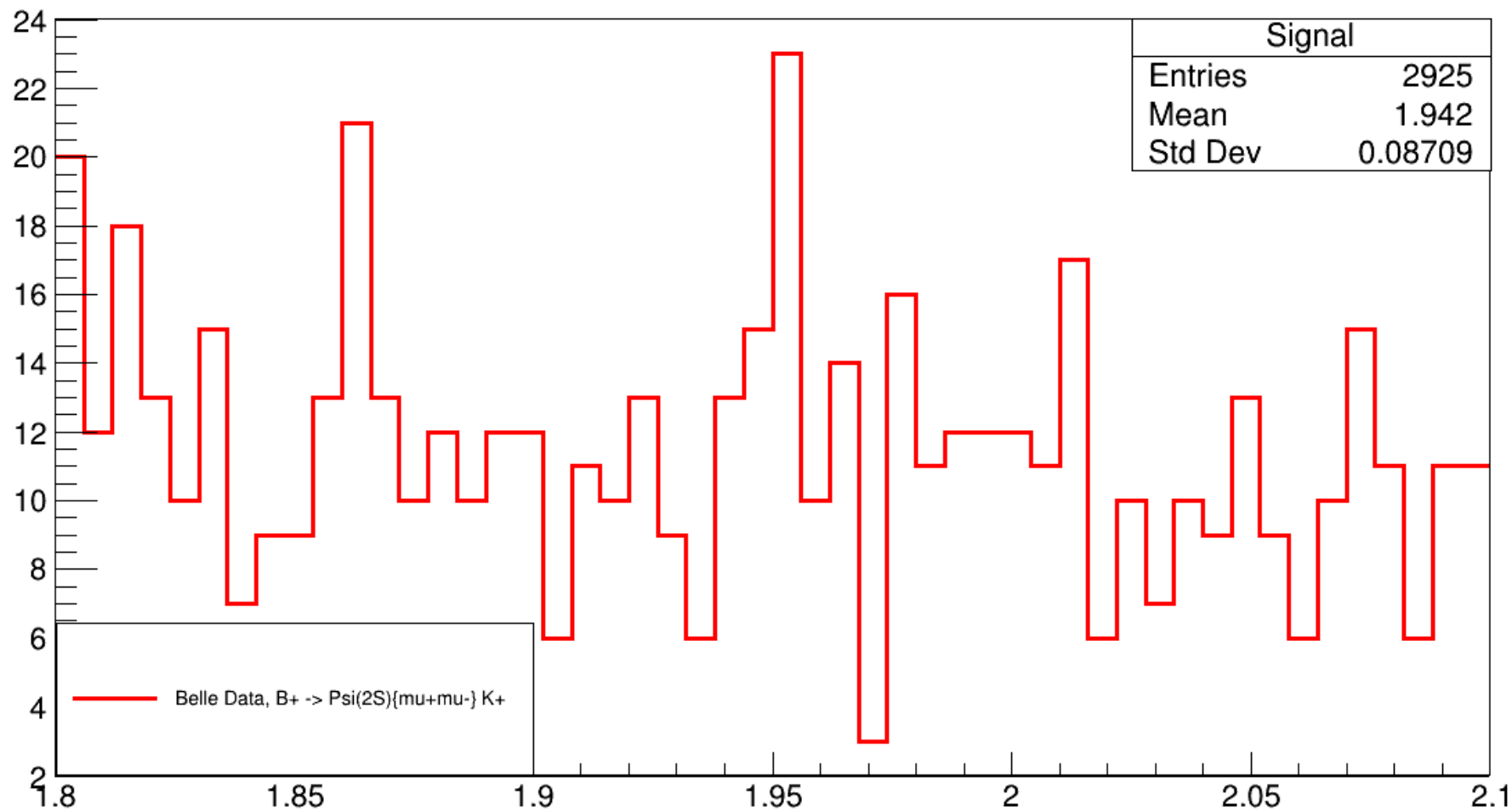
# m\_hadROE with rank 1



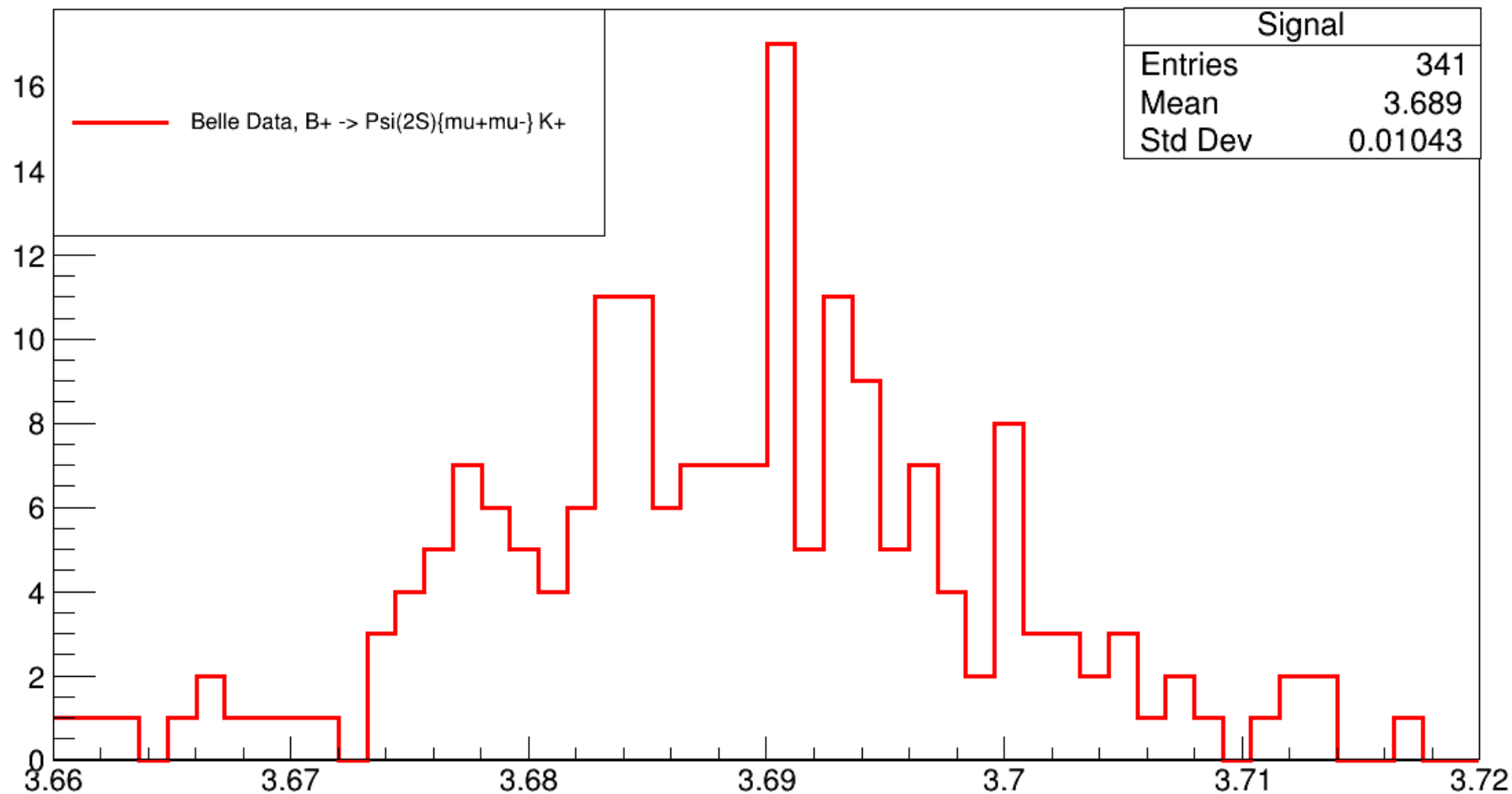
m\_hadROE with rank 1,  $-0.050 < \Delta E_{Bsig} < 0.050$  and  $|\sin \phi| < 1.1$



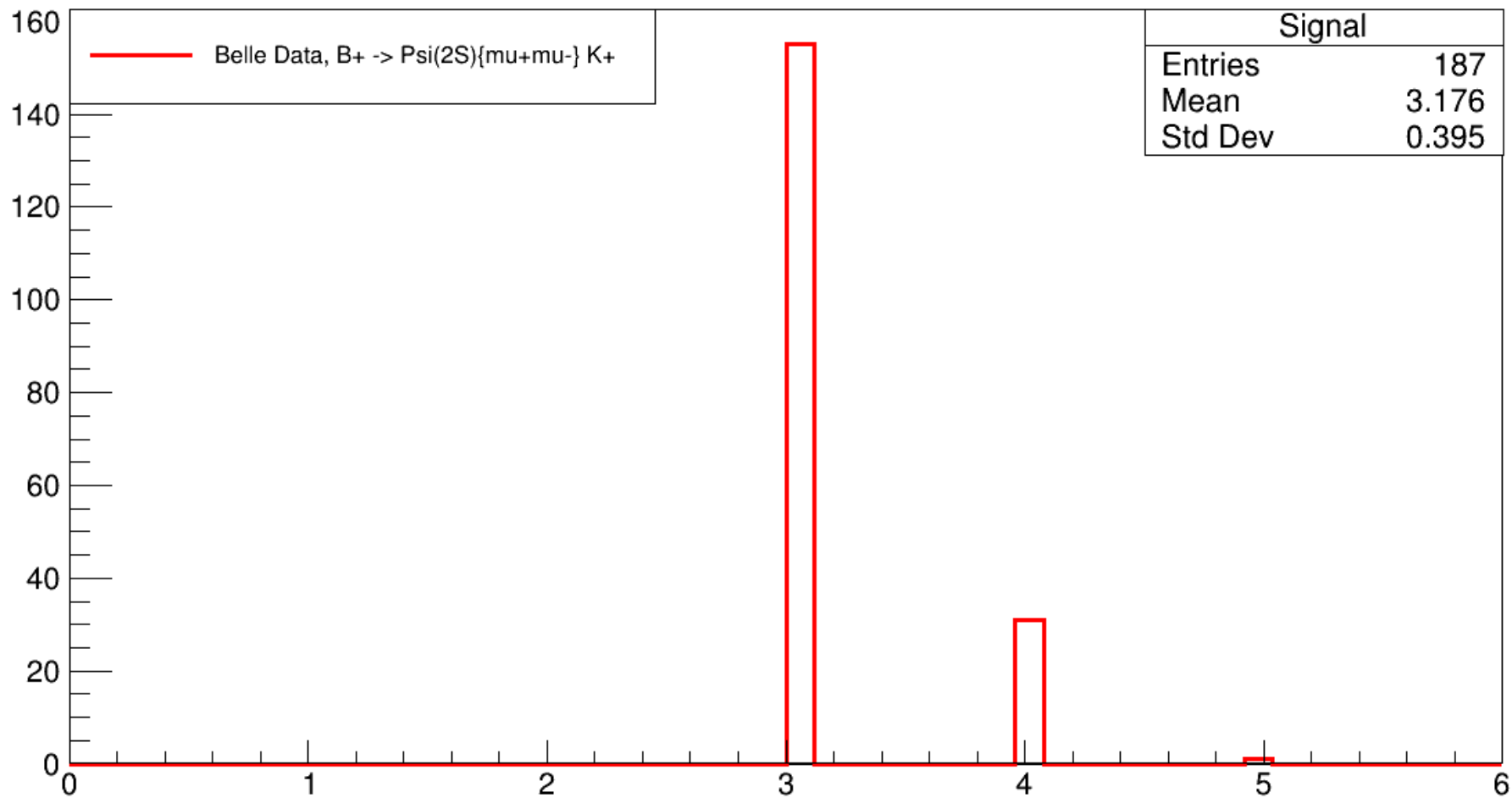
# m\_hadROE with rank 1 and abs(sin\_phi)<1.1



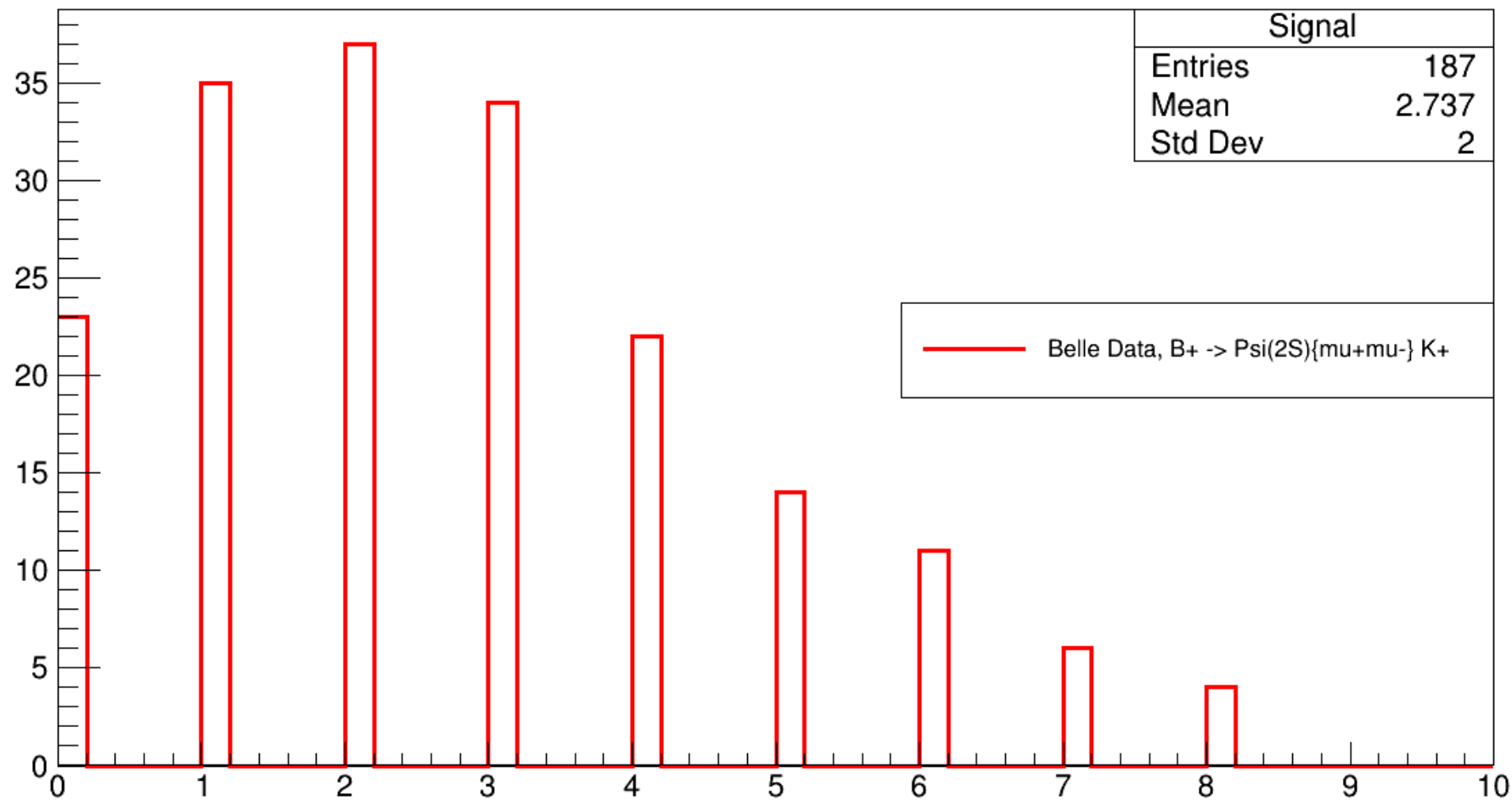
m(Psi(2S)) with rank 1,  $-0.050 < \Delta E_{Bsig} < 0.050$  and  $|\sin \phi| < 1.1$



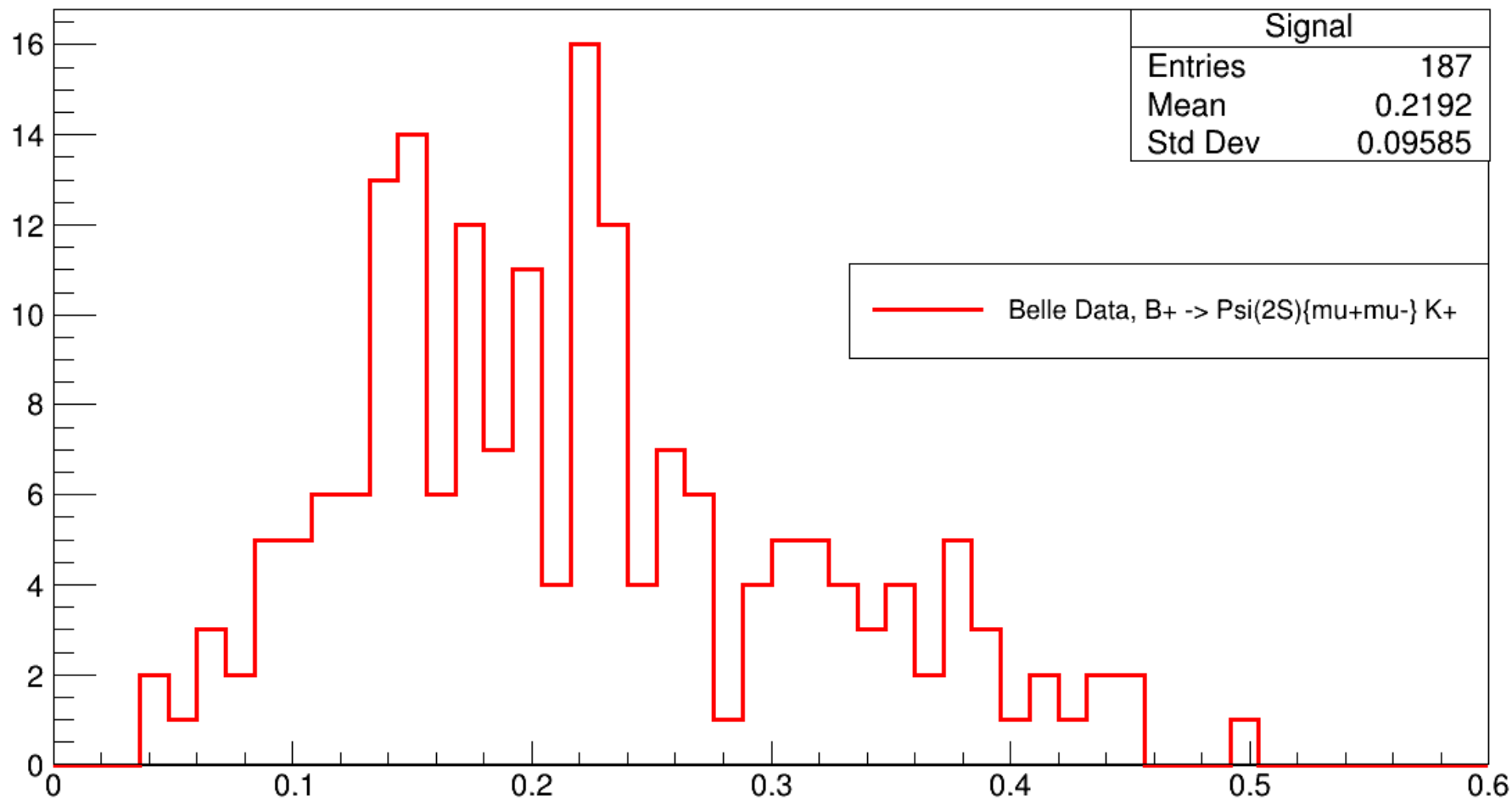
nLepton with Rank1,  $-0.050 < \Delta E_{Bsig} < 0.050$ ,  $M_{bc\_Bsig} > 5.27$  and  $|\sin \phi| < 1.1$



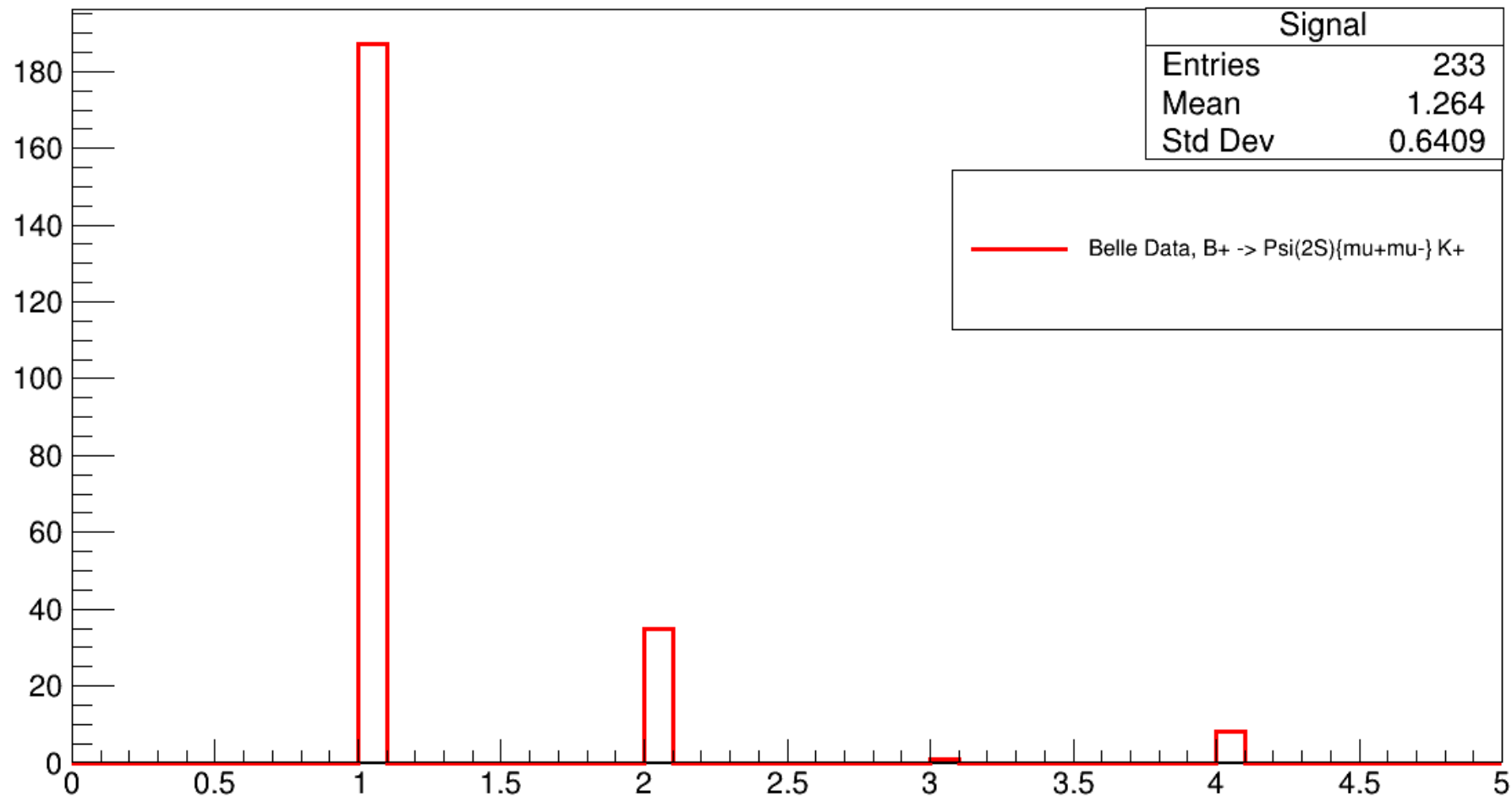
No. of photons with Rank1,  $|\sin(\phi)| < 1.1$ ,  $-0.050 < \Delta E_{\text{Bsig}} < 0.050$ ,  $M_{\text{bc}} > 5.27$



foxWolframR2 with Rank1,  $-0.050 < \Delta E_{\text{Bsig}} < 0.050$ ,  $M_{\text{bc\_Bsig}} > 5.27$  and  $|\sin \phi| < 1.1$

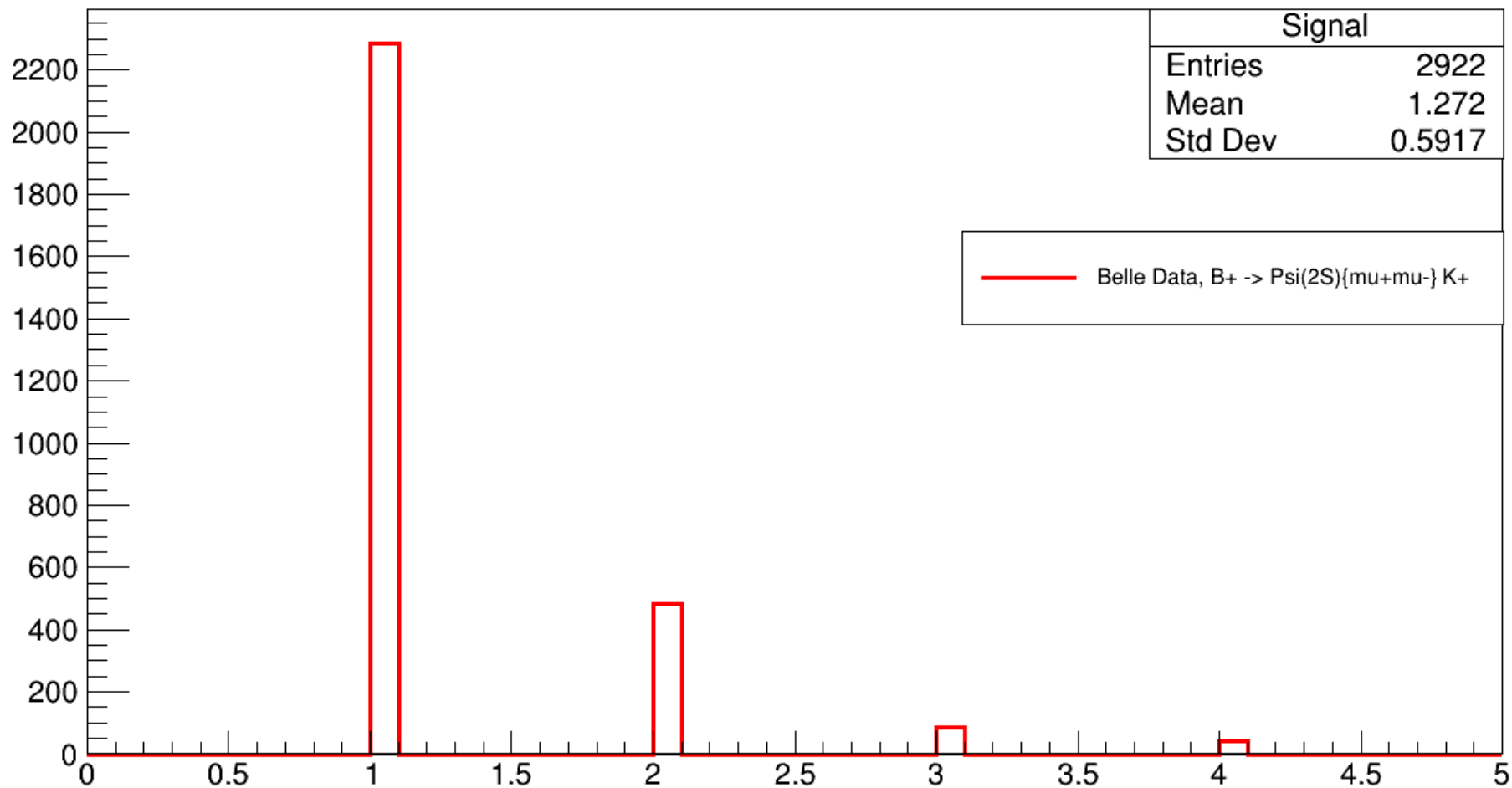


Rank (No. of candidates) with  $-0.050 < \Delta E_{Bsig} < 0.050$ ,  $M_{bc\_Bsig} > 5.27$ , and  $|\sin \phi| < 1.1$

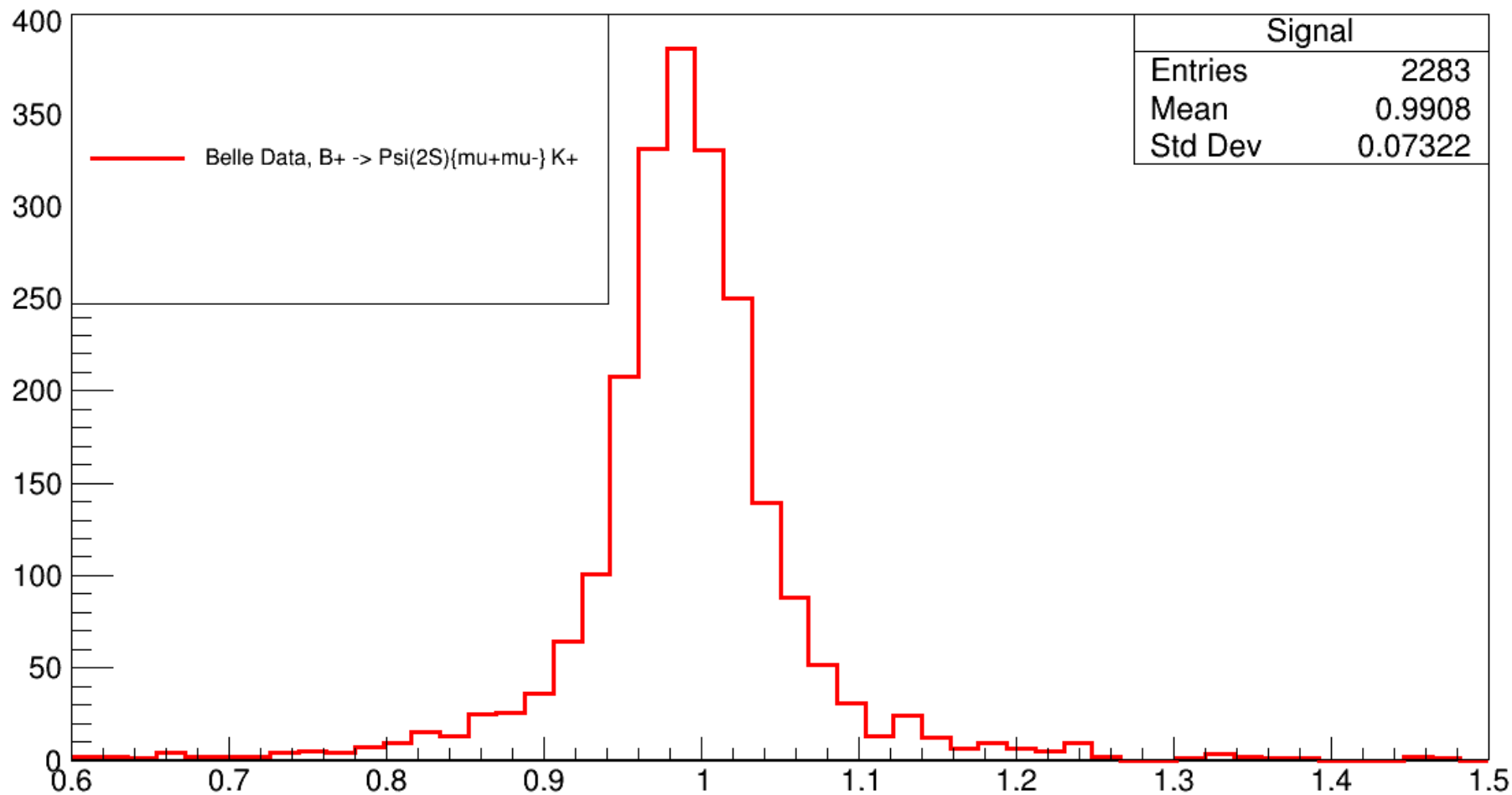




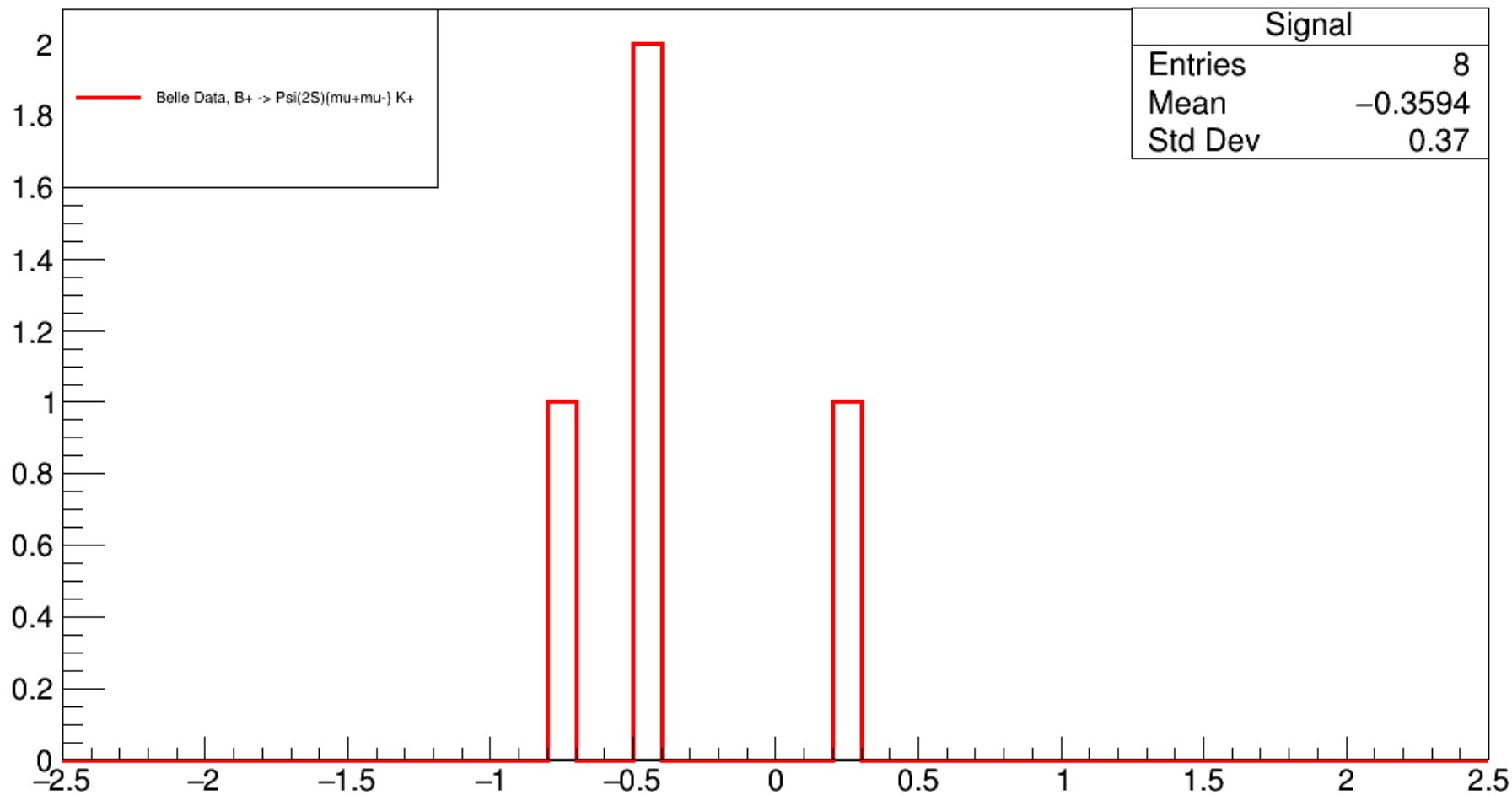
Rank (No. of candidates) with  $-0.050 < \Delta E_{Bsig} < 0.050, M_{bc\_Bsig} > 5.27$



sin\_phi (reco Psi mass) with Rank1,  $-0.050 < \Delta E_{\text{Bsig}} < 0.050$ ,  $M_{\text{bc}} > 5.27$



cos $\Delta\theta$  with rank 1,  $-0.050 < \Delta E_{\text{Bsig}} < 0.050$ ,  $M_{\text{bc\_Bsig}} > 5.27$ ,  $|\text{m\_hadROE} - 1.86| < 0.015$  and  $|\sin \phi| < 1.1$



$\cos(P_{\text{Btag}}, p_{\text{vis}})$  with rank 1,  $-0.050 < \Delta E_{\text{Bsig}} < 0.050$ ,  $M_{\text{bc\_Bsig}} > 5.27$ , and  $|\sin \phi| < 1.1$

