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Performance of PID using Neural Network for MC12 and proc9 data

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Abstract

This note contains approved plots of the study about the performance of PID using Neural Network for MC12 and proc9 data. More details at: BELLE2-NOTE-TE-2020-005.

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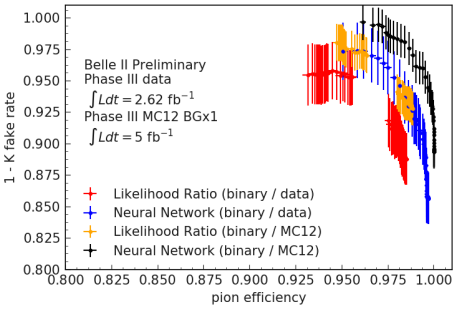
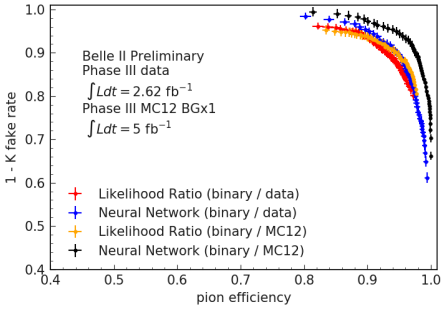
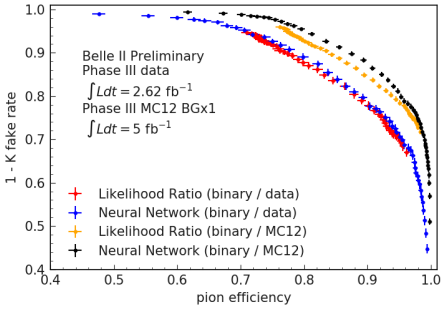


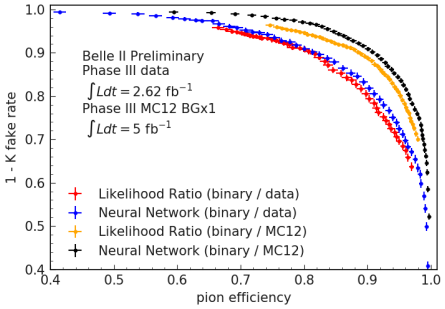
(a) $p < 0.5$ GeV/c



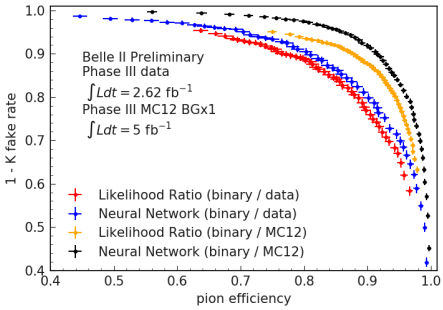
(b) 0.5 GeV/c < p < 1.0 GeV/c



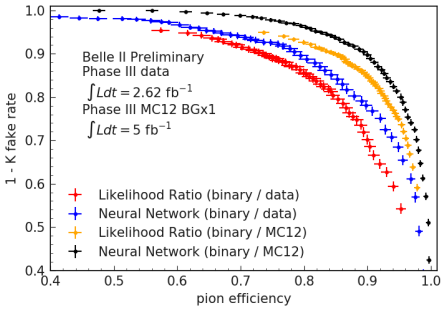
(c) 1.0 GeV/c < p < 1.5 GeV/c



(d) 1.5 GeV/c < p < 2.0 GeV/c



(e) 2.0 GeV/c < p < 2.5 GeV/c



(f) 2.5 GeV/c < p < 3.0 GeV/c

FIG. 1: pion efficiency vs Kaon fake rate with 2.62 fb^{-1} data sample and 5 fb^{-1} MC12 sample in each momentum region. These efficiency and fake rate are calculated by using the decay $D^{*+} \to [D^0 \to K^-\pi^+]\pi^+_{slow}$.Further detail is described in BELLE2-NOTE-TE-2020-005.

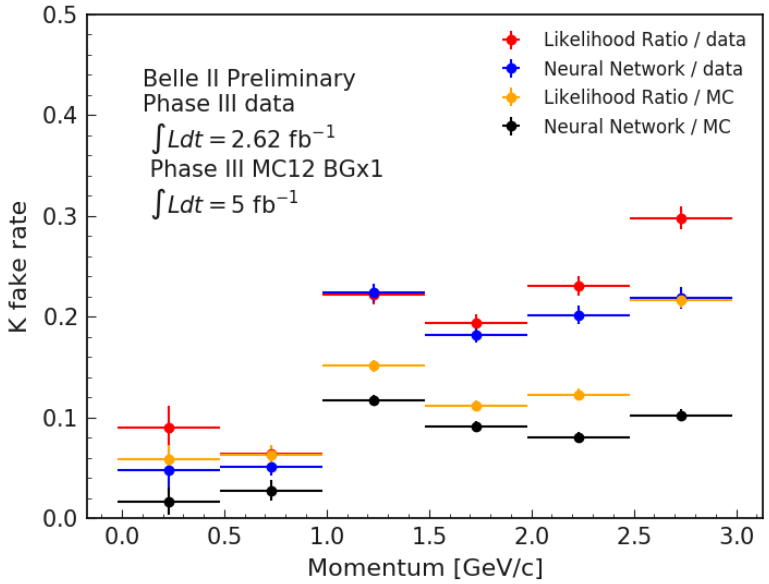


FIG. 2: The summary of the Kaon fake rate when pion efficiency is 90% (98% in the momentum less than 0.5 GeV/c) for both Likelihood Ratio and Neural Network criteria, and also with both 2.62 fb^{-1} data and 5 fb^{-1} MC12 sample in each momentum region. Further detail is described in BELLE2-NOTE-TE-2020-005.

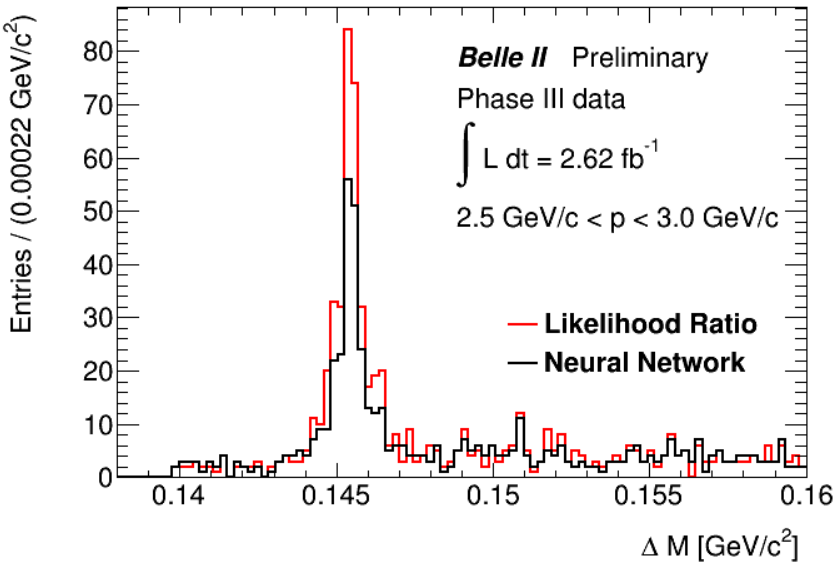
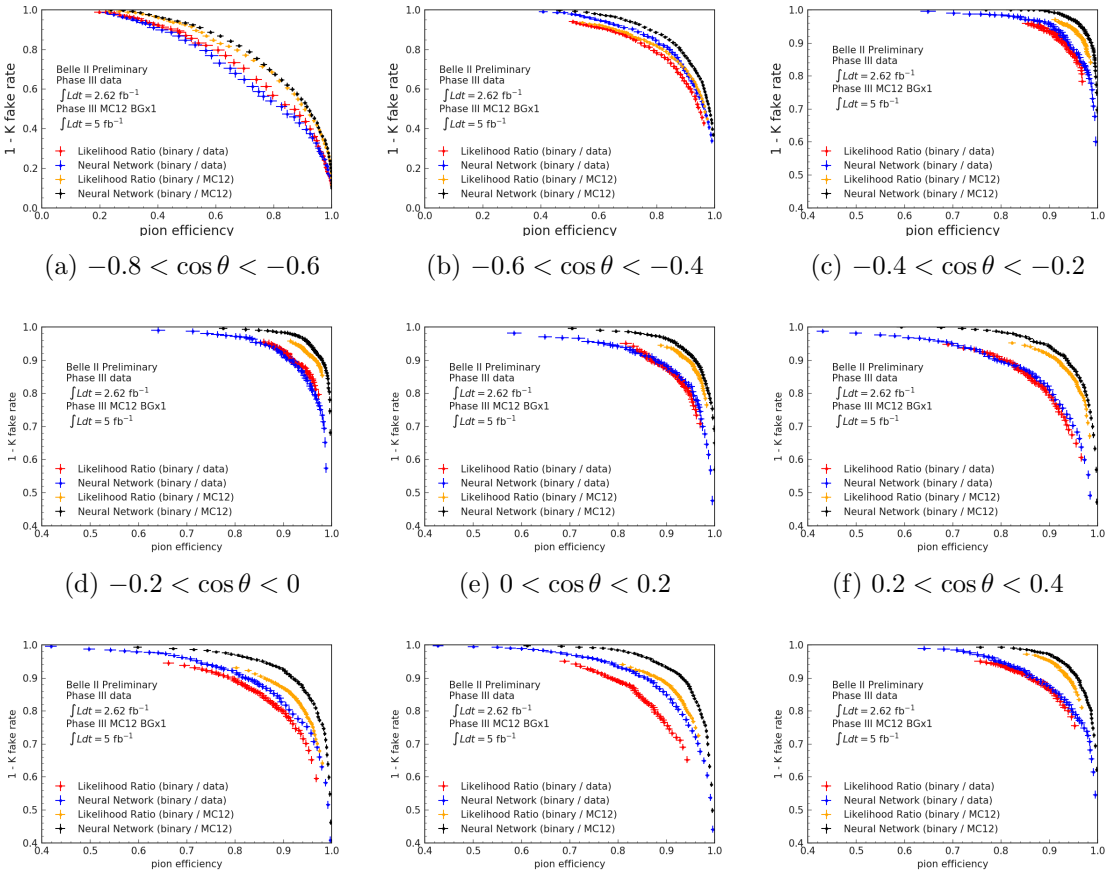


FIG. 3: The $M_{K\pi\pi_{slow}} - M_{K\pi}$ ($= \Delta M$) distribution for the Kaon candidates in the region greater than 2.5 GeV/c for both Likelihood Ratio and Neural Network criteria when pion efficiency is 90%. The number of the events contained in the peak corresponds to the misID K tracks. Further detail is described in BELLE2-NOTE-TE-2020-005.



(a) $-0.8 < \cos\theta < -0.6$ (b) $-0.6 < \cos\theta < -0.4$ (c) $-0.4 < \cos\theta < -0.2$

(d) $-0.2 < \cos\theta < 0$ (e) $0 < \cos\theta < 0.2$ (f) $0.2 < \cos\theta < 0.4$

(g) $0.4 < \cos\theta < 0.6$ (h) $0.6 < \cos\theta < 0.8$ (i) $0.8 < \cos\theta < 1$

FIG. 4: pion efficiency vs Kaon fake rate in each $\cos\theta$ region. Further detail is described in BELLE2-NOTE-TE-2020-005.

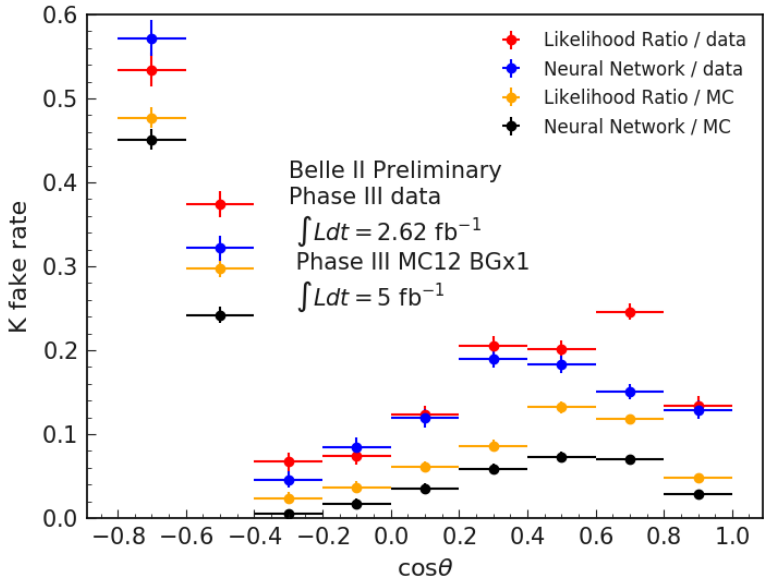


FIG. 5: The summary of the Kaon fake rate when pion efficiency is 90% in each $\cos\theta$ region.Further detail is described in BELLE2-NOTE-TE-2020-005.