Study of Cuts to Remove Photon Conversion to (e^+e^-)

Don Hochman and Uri Karshon

Weizmann Institute of Science

9 March 2016

Previously ZEUS applied a cut of $M(e^+e^-) > 0.05$ GeV to remove γ conversions

In Studying $\phi \to M(K^+K^-)$, a narrow peak near threshold was seen in the Data

This excess in $M(K^+K^-)$ was also seen in Reconstructed Monte Carlo

It was not seen in Generated Monte Carlo

From matching these Generated and Reconstructed MC events: They were e^+e^- events

Recent HERA2 Pentaquark paper used a cut of $M(e^+e^-) > 0.07$ GeV

An analogous low mass enhancement was seen in $M(p\overline{p})$ Events

Events were selected with corrected dE/dx > 1.20 for each charged K

Following Plots show $M(K^+K^-)$ for various $M(e^+e^-)$ cuts and various probability cuts

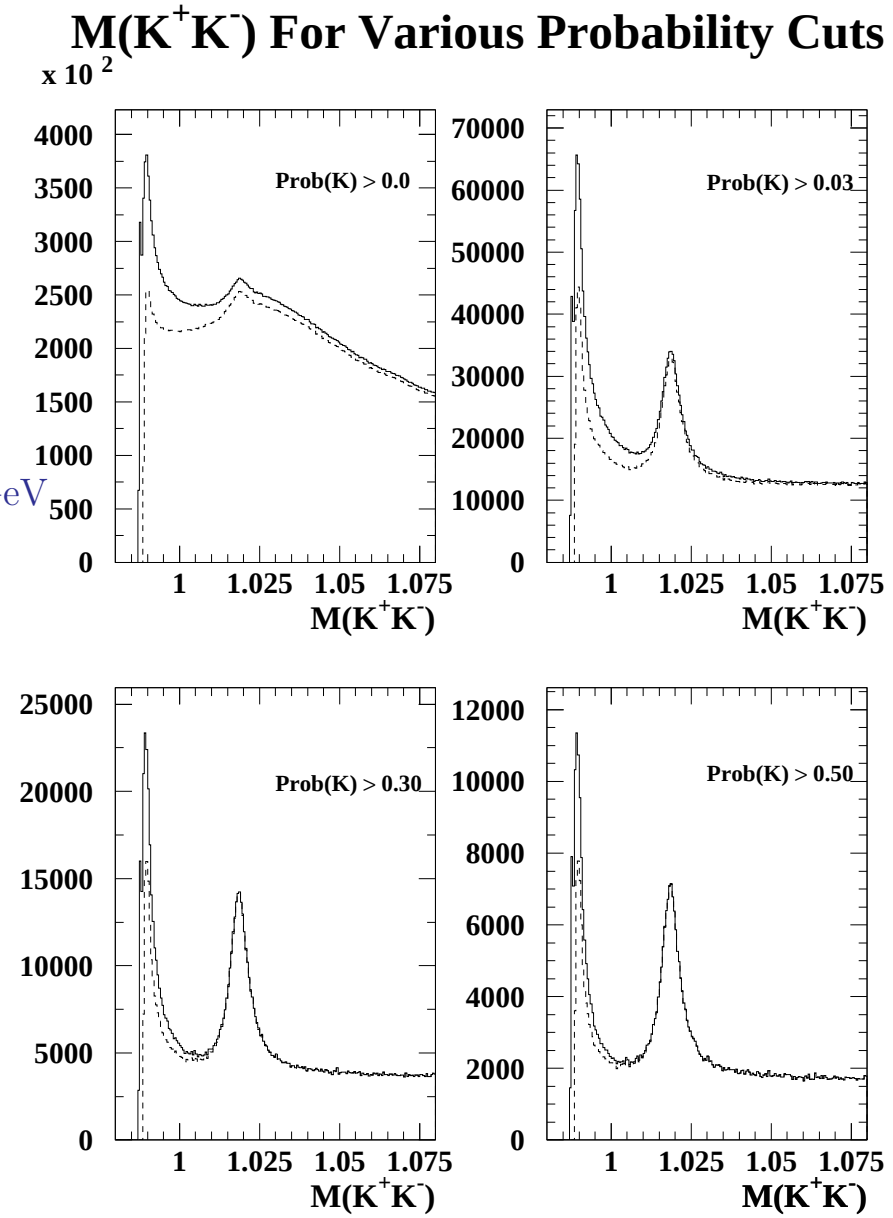
Probability is chisq probability from energy loss for $K^{\pm}$

Calculated from dE/dx and $K^{\pm}$ momentum

Solid Histograms: No $M(e^+e^-)$ cut

Dashed Histograms: $M(e^+e^-) > 0.050$ GeV

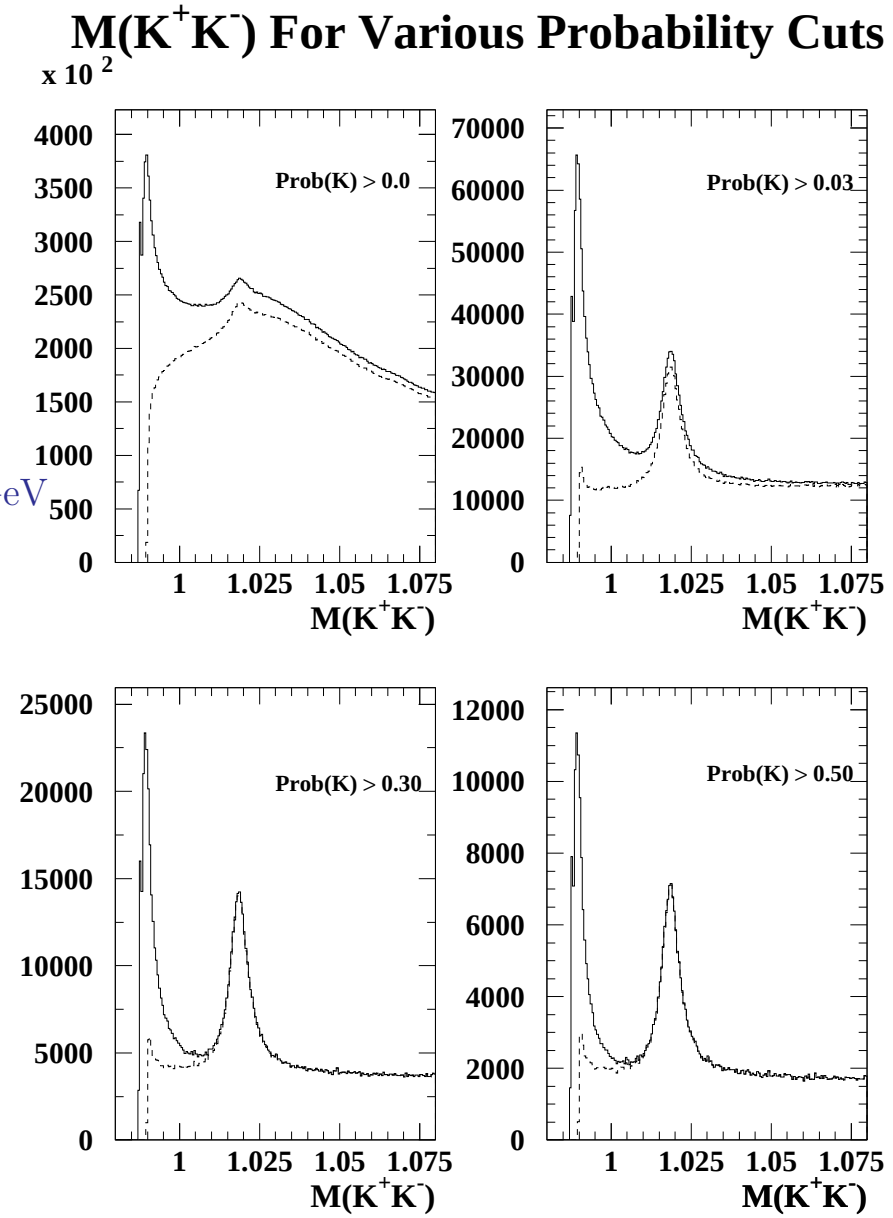
Low Mass Peak Exists Even After Cut



Solid Histograms: No $M(e^+e^-)$ cut

Dashed Histograms: $M(e^+e^-) > 0.070$ GeV

Low Mass Greatly Reduced After Cut

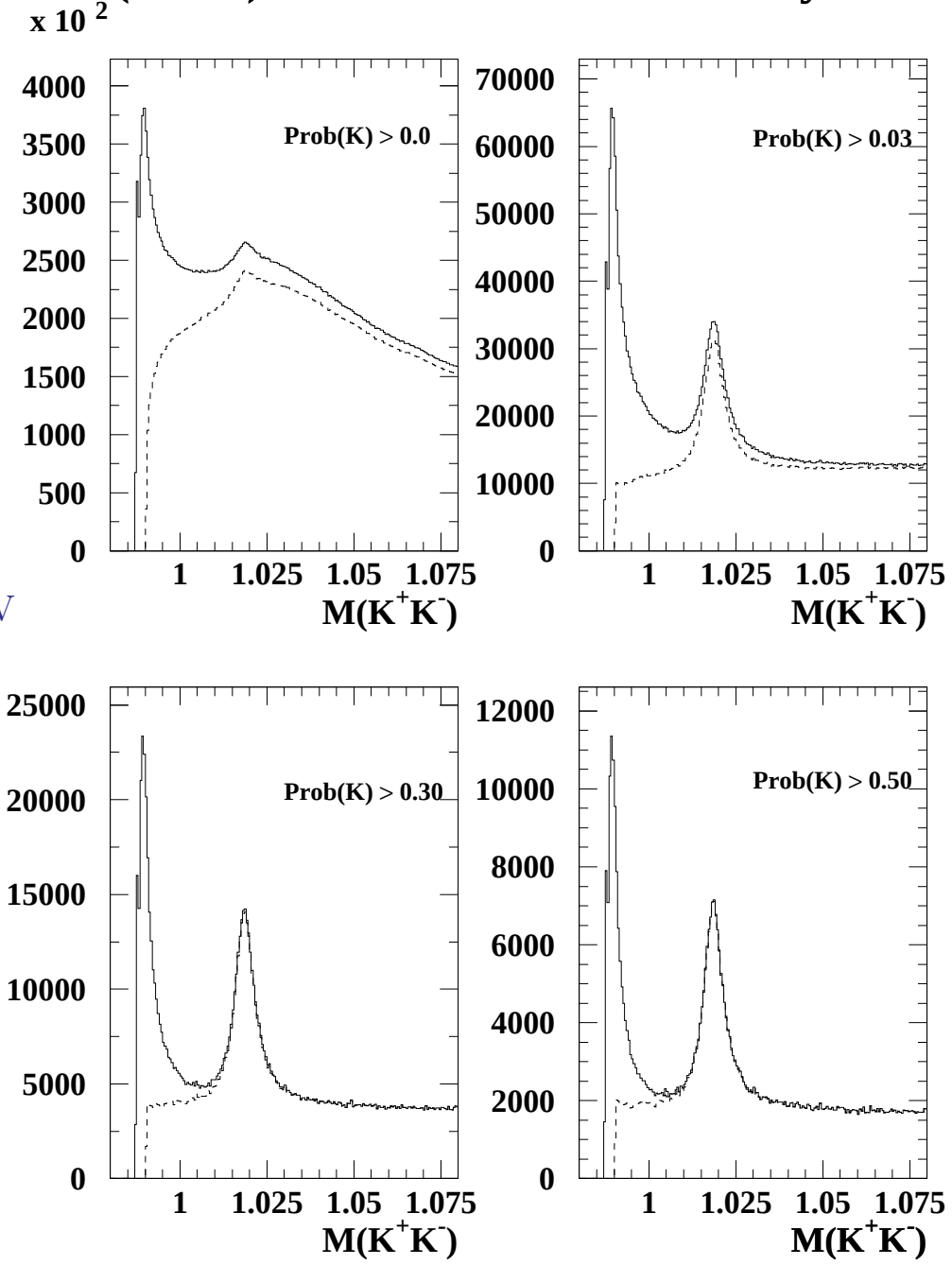


$M(K^+K^-)$ For Various Probability Cuts

Solid Histograms: No $M(e^+e^-)$ cut

Dashed Histograms: $M(e^+e^-) > 0.075$ GeV

Low Mass Peak Nearly Vanishes After Cut

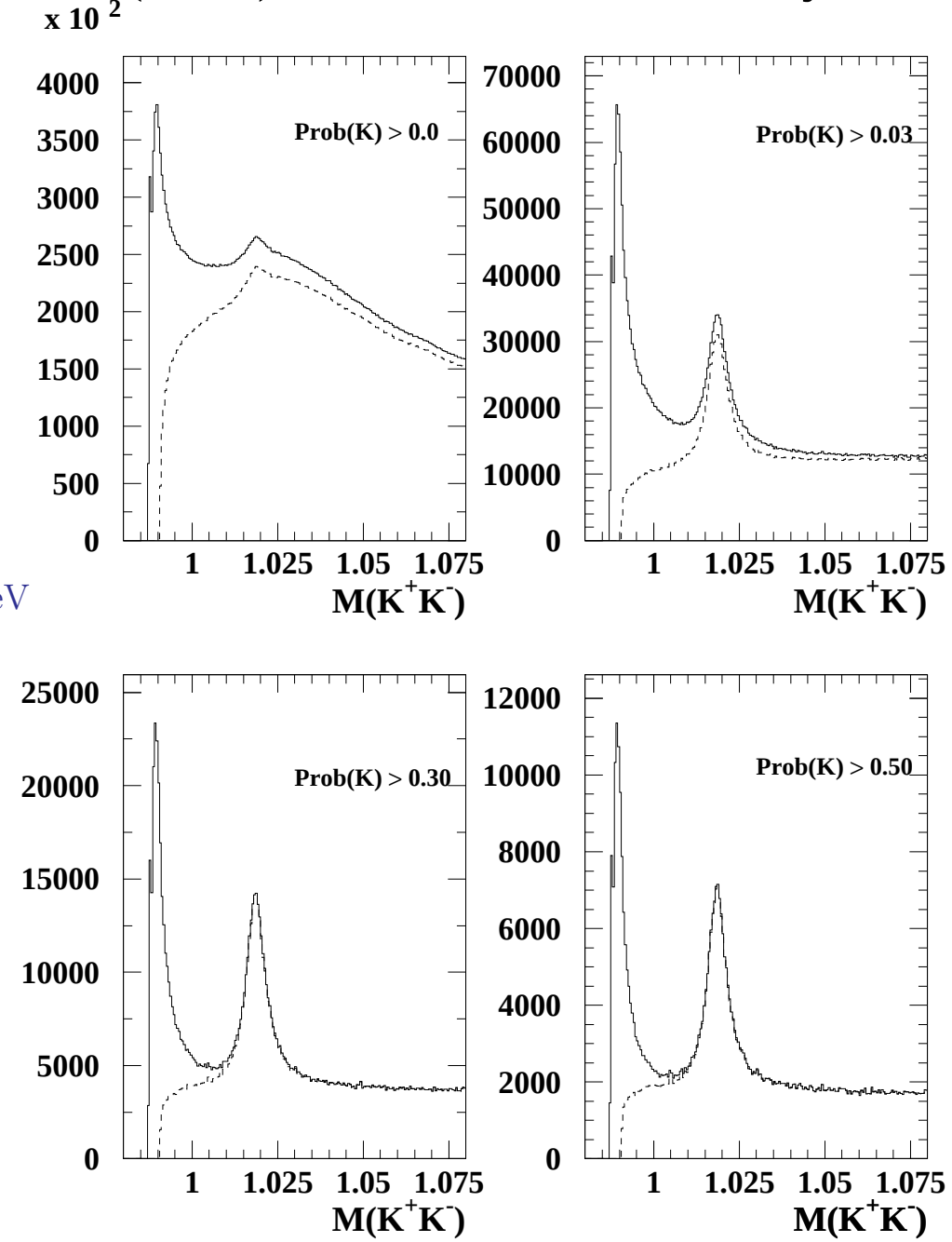


$M(K^+K^-)$ For Various Probability Cuts

Solid Histograms: No $M(e^+e^-)$ cut

Dashed Histograms: $M(e^+e^-) > 0.080$ GeV

Low Mass Peak Vanishes After Cut



SUMMARY

Low Mass Peak Removed for $M(e^+e^-) > 0.080$ GeV and mostly for > 0.075 GeV

Future analyses should use one of these higher cuts