Review of the analysis note Direct photoproduction of narrow baryon resonance in the reaction $\gamma p \to p K^0 \bar{K}^0$ in CLAS

V. Kubarovsky (vpk@jlab.org)

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1 vpk

- The analysis note was written on June 17, 2013, 9 yeas ago. In general, this analysis note is too short (20 pages only) and does not contain many necessary details that are needed to claim the existence of a pentaquark. The low level distributions, such as momentun, angles of all particles in data and Monte Carlo are absent. The calculation of the acceptance is completely missing.
- Fig. 5. What are the cuts for this picture? Is it for K_S or for $(\pi^+\pi^-)$?
- Fig. 6. One dimensional projections needed. Better $M(p\pi^+\pi^-)$ and $M_X(\pi^+\pi^-)$.
- Fig. 6. It is typical example of cut's selection to grow the peak.
- Fig. 7. No justification for this cut is given exempt the visibility of the peak near 1.55 GeV.
- Fig. 8. DOCA2 cut looks strange for me. It is less than DOCA1 but DOCA1 has more narrow distribution.
- Fig. 8. Decay distnce look also very suspicious. Why does It go to zero at distance=0?
- Fig. 9. The distributions are very similar. Why do we need cut at 1 cm?
- Fig. 10. Looking to the DOCA2 distribution in Fig. 8 I would like to say that even 1 cm cut is too tight. Analysis is using 0.5 cm. Again, it seems to me that the authors are choosing the cut where the signal is looking better.
- Fig. 11. The choose of the parameter "d" is adequate.
- Fig. 12. Misprint: decay distance $\rightarrow$ collinearity angle, θ_C.
- No discussions of the Fig. 11-14 at all.
- Fig. 15. It is not clear how the number of background events were estimated. By eye this number is around 200, pictures shows 114 events.
- Chapter 6 "Data sampling". I don't think that the sampling of data tests the hypotheses of the resonance existence. It proves mostly that the data itself are stable during the experiment.
- Page 17. Misprint: Fig. 7 $\rightarrow$ Fig.17. There are two more incorrect reference to Fig. 7 at the same page.
- Page 17. "The fact that entire distribution outside of the peak drops significantly gives further confidence that the observed peak is real". Where is this statement coming from?
- Chapter 8. "The $M(pK_S)$ invariant mass". Half a page of the text in this chapter doesn't give the scientific prove of the existence the structure in the $M(pK_S)$ mode.

- Page 19, line 2. Misprint. $M(pK_S \to M(pK_S)$.
- Fig. 20. The picture 20.b is different from the Fig.13 in the draft of the paper. In addition Fig. 13 capture is wrong: $M_X(K_S) \to M(pK_S)$.
- Chapter 8. Acceptance correction is not described at all. How was it done?

2 Historical example of my analysis of the search the pentaquark via interference with ϕ-meson

Below I presented some pictures from my parallel analysis that I made by Moskov's request for the search the pentaquark via interference with ϕ-meson. I was given the ODU cuts that were applied by the ODU group to claim the existence of the resonance. I followed exactly the ODU analysis chain and found no signal.

It is interesting to note that the number of pentaquark events in the direct photoproduction and via interference with ϕ-meson is approximately the same.

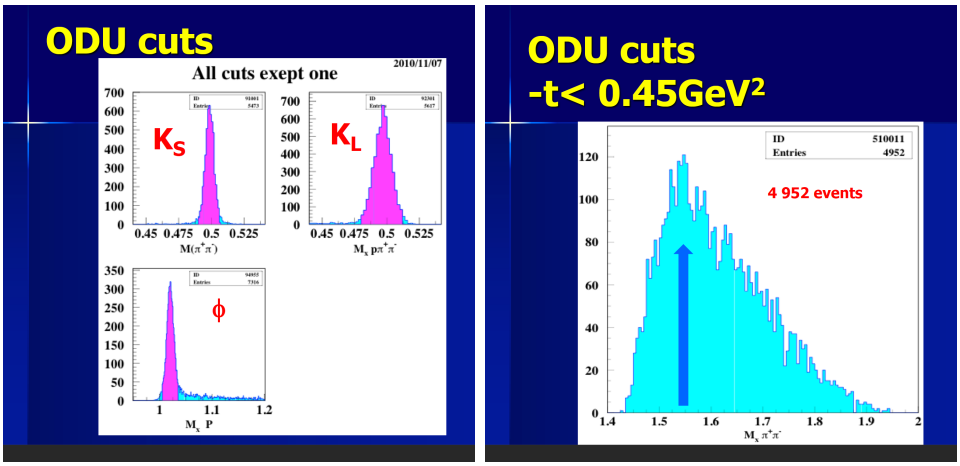

Figure 1: vpk analysis of the ϕ-penta interference using ODU cuts.

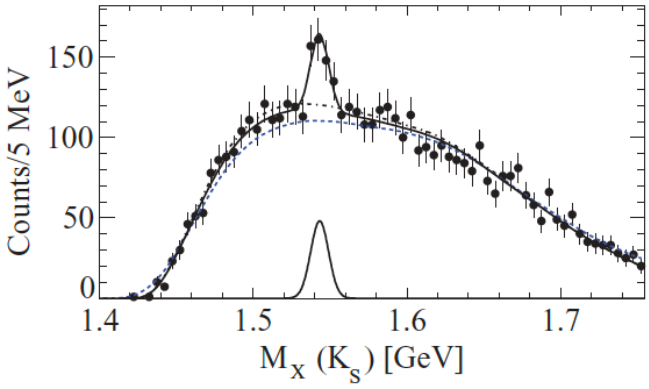

FIG. 10. (Color online) Missing mass of K_S with a cut $-t_\Theta < 0.45$ GeV^2. The dashed line is the result of a ϕ Monte Carlo simulation, the dashed-dotted line is a modified Monte Carlo distribution, and the solid line is the result of a fit with a modified Monte Carlo distribution plus a Gaussian function.

Figure 2: Published in PRC C85, 035209 (2012).