Dear Michael et al,

Greetings Dan

I have read through your draft of the g12 pi0 production analysis and

include my comments below. The paper certainly needs work to improve

the grammar and the style. Hopefully I have managed to capture everything

below. If you have any questions, let me know.

Not sure if "certainly" is the definition here, as most of your comments refer to style rather than grammar (IMO the overuse of the word "the" is being requested when grammatically most of the sentences already in place are "commands of observance" and do not require the word "the"), however we sincerely appreciate your comments.

Regards,

Daniel

---------------------------------------------------------------------------

General:

- Spell out acronyms the first time that you use them. These include

QCD, pQCD, DVCS, CM, etc.

Done.

We removed ref on DVCS upon Volker's suggestion.

We could not find reference to CM, while c.m. and definition is done on line 10

- You are not consistent with your energy notation. Sometimes you use

"E" for the photon energy and sometimes you use "E\_\gamma". I prefer

the later for clarity.

We agree, edited all references of E = to E\_\gamma

- If this paper is to be accepted into PRL, it must be written with the

idea to make it broadly interesting to both experts and non-experts.

There are several notable areas where the discussion is too esoteric

and specialized. I point out some examples below.

- Be consistent with usage of "handbag" vs. "Handbag".

Replaced all "handbag" with "Handbag"

- As written, there is no physics conclusion from this paper. Your message

is that you have performed a measurement using a different final state

and that your data compare better with one model approach over another.

This is not satisfying for the reader.

- The figure captions should not be "centered", but left justified.

Done

- Sometimes you write $\gamma p \to p \pi^0$ and sometimes $\gamma p \to \pi^0 p$.

Be consistent throughout.

Changed all references of \gamma p \to \pi^{0} p to \gamma p \to p \pi^{0}

Page 1:

- Abstract:

- Line 2. Use "... decay and the $e^+e^-$ pair ...".

We have modified the abstract in guidelines suggested that it be more PRL like

- Line 3. Use "... CLAS detector at the Thomas ...".

We have modified the abstract in guidelines suggested that it be more PRL like

- Line 6. Use "The final state particles $p$, $e^+$, and $e^-$ were detected

in CLAS, whereas the ...".

We have modified the abstract in guidelines suggested that it be more PRL like

- Line 7. Use "... sample has quadrupled the ...".

We have modified the abstract in guidelines suggested that it be more PRL like

- Line 8. Use "... $E = 2$~GeV, and appear to favor ...".

Changed the wording as per a request from Volker Burkert.

- Final sentence has no physics content. What does this imply and why is

this statement important?

We added some text to the final wording of the abstract.

- Line 13. Use "... models, and QCD.".

That is bad grammar, thanks for noticing the need for a comma.

- Line 17. Use "... production regime and the ...".

OK

- Line 27. Use "... [3], as well as ...".

Done

- Line 35. Use "... $t$-channel $J^{PC}$ quantum ...".

Done

- Line 46. Use "... $t$-channel ... numbers, along with ...".

Done

- Line 56. Use "... zeroes in the Regge residues.".

Done

- Line 60. What is a "nonsense wrong signature zero"? This is definitely jargon.

It needs a reference and a sentence of explanation/context.

NWSZ is introduced here. We added some more content and added a reference.

- Line 62. Use "... in the $\pi^0$ data.".

Done

- Line 69. Use "However, to explain the lack of a dip at $t \approx -0.5$~GeV$^2$ in

$\eta$ photoproduction, they removed the standard wrong signature zero in an ad hoc

manner." What is a "standard wrong signature zero"? This is jargon.

Added "i.e. the NWSZ"

- Line 72. Use "... $t$-channel ... \omega$, and $b\_1^0$ exchange, but not ...".

Done

- Line 74. What do you mean with the notation "$\rho \times$ Pomeron cuts" and

"$\rho \times f\_2$ cuts"?

The convolution of rho with a Pomeron...convolution of rho with a f\_2

Page 2:

- Line 77. Use "$u$-channel".

Done

- Line 79. Use "$t$-channel".

Done

- Line 88. Use "complementary".

Done

- Line 95. Use "... measurement of the beam spin asymmetry ...". Actually I am not sure

why you are bringing up this measurement here. It does not seem relevant.

Agreed, sentence was removed

- Line 100. Use "... transverse momentum, which corresponds to ...".

Done

- Line 101. What is this angle theta? It needs to be defined.

Defined

- Line 102. Use "... may extend to the ... case proposed in [10]."

Done

- Line 106. Use "... the production cross section.".

Done

- Line 107. Use "Binary reactions in QCD with large ...".

Thanks for noticing that comma.

- Line 108. Use "... between the colliding ...".

Adding the word "the" to colliding causes the reader to ask "Which colliding particles?", while without the word "the" its inferred that particles are colliding.

- Line 110. Use "... [3] provide a simple recipe ...".

Done

- Line 114. Use "... of these counting rules ...".

Done

- Line 115. Use "As was first observed at SLAC by Anderson {\it et al.} [13], the ...".

Done

- Line 118. Do not put [13] here but earlier as I suggest.

Agreed

- Line 119. Use "$s = 6$~GeV$^2$ ...".

Done

- Line 121. Use "$s = 10$~GeV$^2$.".

Done

- Line 124. I do not understand your notation of $d \sigma/dt(\vert t \vert)s$. This is

not standard.

Modified

- Line 127. Use "... p \pi^0$ for 2.0 ...".

This was suppose to be a set of phrases, with the second not essential to the meaning of the sentence. Therefore I added the comma where the clause was to be separated.

- Line 129. Again, this odd notation for the cross section appears again.

Modified

- Line 132. Use "... range of exclusive ...".

Modified

- Line 140. Your units here should be GeV not MeV.

Corrected and inexcusable

- Line 147. Use "$E = 2$~GeV".

Was already there. Latex formatting?

- Line 151. Use "... the CLAS detector at Jefferson Laboratory using a ...". Be sure to

include the CLAS reference here (B.A. Mecking {\it et al.} ...}.

Done

- Line 152. Use "... from a 5.72~GeV ...".

Done

- Line 155. Use "$g12$".

OK

- Line 159. Use "... decay into an ...".

Done

- Line 161. What do you mean by "$\pi^0 \to \gamma^\* \gamma$"?

The Dailtz decay is defined as a decay into a photon and virtual photon pair. The accepted nomenclature for this is \gamma\* gamma, where \gamma\* -> e+e- and since it is virtual, the e+e- invariant mass has a distribution with information of the structure of the meson.

- Line 163. Use "... tracks, $p$, $e^+$, $e^-$, as ...".

See response to this in abstract response.

- Line 164. Use "... which imposed limitations ...".

Both are grammatically correct. However, we removed the comma.

- Line 169. Use "... for $p$, $\pi^+$, and $\pi^-$ tracks, ...".

Done

- Line 172. The statement of "standard $g12$ calibration" is not meaningful for the reader.

A reference is necessary here.

The reference is there, as the "standard $g12$ calibration" and fiducial cuts both fall under the reference 21. See next comment.

- Line 173. Put [21] at the end of this sentence.

Done

- Line 181. Use "mass of the $e^+e^-(\gamma)$ to be the $\pi^0$ mass.".

Authors like how the sentence is written. The suggested amendment would have to be written   
"squared invariant mass of the $e^+e^-(\gamma)$ to be the $\pi^0$ mass squared.".  
Too many squares for us "young'ins"

- Line 182. Use "... using the statistical ...".

Done

- Line 185. Do not begin a new paragraph with this sentence. It belongs with the previous

paragraph.

Thanks, we missed that formatting error

- Line 186. Use "... between the $g12$ ...".

Done

- Line 194. Use "... off the proton, $M\_x^2(p) = (P\_\gamma + P\_p - P'\_p)^2$, in terms of the

four-momenta ...".

Page 3:

- Fig. 1:

- The plots need to have the color z-scale include.

Done

- Caption.

- Line 1. Use "(Color online) (Left panel) $M\_E(pe^+e^-)$ vs. $M\_x^2(p)$.

(Right panel) M\_x^2(pe^+e^-)$ vs. $M\_x^2(p)$. The top-right (bottom-right)

panel shows the distribution before (after) applying the $M\_E(pe^+e^-) < (>)

75$~MeV cut.".

Caption was changed per another request.

- Fig. 2 caption.

- Line 2. Use "... in the proton missing mass squared for events ...".

Done

- Line 195. Use "... proton, and final ...".

Done

- Line 196. Use "... proton, respectively, and the ...".

Done

- Line 198. Use "... the $\pi^+\pi^-$ ...".

Done

- Line 206. Use "... by the red solid line.".

Done

- Line 207. Use "... 0.0179$~GeV$^2$ with a Gaussian width ...".

Done

- Line 208. Use "... asymmetric cut about the measured value was placed ...".

Done

- Line 210. Include units on mass squared range.

Done

- Line 216. "Overall the systematic uncertainty varied ..." Systematic uncertainty

on what quantity? Be clear.

Modified sentence

- Line 221. Use "$z$-vertex".

- Line 222. What do you mean by the systematic uncertainty on the "sector-to-sector"?

All systematic uncertainties and their determinations are described 226 in Ref. [23].

- Line 224. What do you mean by the systematic uncertainty on the "1C pull probability"?

All systematic uncertainties and their determinations are described 226 in Ref. [23].

- Line 227. Use "The new CLAS high statistics $\gamma p \to \pi^0 p$ cross sections from

this analysis are compared in Figs.~3 and 4 with data from previous CLAS~[19], DESY

[add ref.], CEA~[add ref.], SLAC~[add ref.], and Cornell~[add ref.] measurements, as

well as lower c.m. energy MAMI A2 measurements~[26]."

Modified, but the reference to 18 was a unit for 3 measurements. So some parts of the sentence remained.

- Line 238. Use "... scaling at fixed $t/s$ as expected ...". This is also a bit of jargon

that the non-expert will not understand.

We do not feel that a reader of this paper would find t.s cargo as it is a standard term

- Line 241. Use "... leading to $n = 6.89\pm0.26$."

Done

Page 4:

- Fig. 3 caption.

- Line 1. Use "... cross sections for $\gamma p ...". Write cross section in

math mode.

Done

- Line 3. Use "... tagged photon data ...".

Done

- Line 4. Use "The black open filled ...".

Must be a typo here, how can you be open and filled?

- Line 5. Use "$E$ = 2~GeV [18]. The plotted ...".

Done

- Line 6. Use "The black dot-dashed ...".

Done

- Line 7. Use "... with $n = 6.89 \pm 0.26$, ... The pion production ...".

Done

- Line 8. Use "... The Regge results [4,9] are given by the black dotted and

blue dash-dotted lines, respectively.".

Done

- General: The Regge results are very difficult to even find on these plots.

- Line 243. Put "s" in math mode.

Done

- Line 249. Do not begin a new paragraph with this line. It belongs with the

previous sentence.

Done

- Line 251. Put "E" in math mode.

Done

- Line 253. What is the angle theta? When it is first introduced make this clear.

We already made this definition elsewhere

If it is the pi0 CM angle, I would suggest using throughout "$\cos \theta\_{\pi}^\*$".

Great suggestion. Done

- Line 256. Use "... of these dips. Note that ...".

Done

- Line 259. Put "E" in math mode.

Done

- Line 260. Awkward phrasing. I suggest "... 2.6~GeV$^2$ and evidence of structure

around ...".

We are not claiming that this is a new structure, so we kept this phrase as is.

- Line 262. Put "E" in math mode.

Done

- Line 268. Use "... at the largest $\vert t \vert$ ...".

Done, but I see no difference

- Line 275. This paragraph is a bit of a misplaced orphan. Move it to the end of the

paragraph beginning on line 281.

Done

- Line 282. Use "... based on the $\pi^0$ Dalitz decay mode.".

Done, but the Dalitz decay is not only for the pi0, eta and eta' have Dailtz decays with identical decay products

Page 5:

- Fig. 4 caption.

- The energy variables "E" and "W" in the caption (lines 2, 3, 4, 6) should be

written in math mode, i.e. "$E$" and "$W$".

Done

- Line 4. Use "... CLAS $g12$ measurements (red ...".

Done

- Line 7. "... indicated on each panel.". There are no energy values indicated on

any of the panels.

This is pedantic, as the panels are labeled with letters which are defined in the caption, therefore "indicated".

- Line 290. Use "... covered by the "resonance" ...".

Done

- Line 293. Use "... here have quadrupled ...".

Keeping style in 3rd person past, therefore not placing "have".

- Line 294. Use "... above $E$ = 2~GeV ...".

Done

- Line 296. The main conclusion sentence "By comparing this new and greatly ..."

does not make any physics statement. This needs some attention as it is far from

satisfying.

Done

- Line 302. Use "Ph.D.".

Done

Page 6:

- Ref.[7]. Add a comma after "Ostrick".

Done

- Ref.[18]. Remove extra space before final period.

Done

- Ref.[19]. Add "[CLAS Collaboration]".

Done

- Ref.[23]. Remove extra space after "ACAT".

Done

Best Regards

Team π paper