First round remarks:

1. Overall, we think the results are significant, but we are not sure the paper is the current stage presents a strong case for PRL.
2. The paper reads like 2 or 3 three people wrote separate parts – transitions are lacking.
3. Below are some detailed comments, but a thorough read and restructuring by the authors would be desired before we provide more detailed comments.

Some General Comments:

1. Abstract: The abstract is a bit weak for a PRL paper. Also, "The final state …..missing mass of proton" doesn't really belong there. "missing mass of proton" is wrong as well.

2. "This experiment is a unique opportunity". Which experiment? This is quite an abrupt introduction of the experiment without actually giving any details. This seems a random injection of a sentence / paragraph by itself.

3. What are the reasons behind the different approaches by Laget, Mathieu and others? They were presented together as a group, yet have different prediction powers? How so?

4. The "quark counting rule" is presented, incorrectly, as a model. But it really is not a model. It is usually referred to as the "constituent counting rule", is it not? We think a brief overview of this "rule" is warranted, and the implication of it, as well as the explanation of why at certain regions the deviation is expected probably could be discussed a bit.

5. "very large systematic uncertainties …. recent tagged CLAS g1c": it is not necessary to "play down" the quality of the g1c data, which really are not that recent. And the quoted 5% systematic uncertainty of g1c results doesn't seem "very large", especially compared with the current results reported here. It is true, that the new results have much more statistics and coverage – that should be emphasized.

6. The experimental details are lacking. When was the data taken? How are the particle ID done. What was the timing resolution and how was it determined? How were the confidence level cuts set? These details do not take much space; previous CLAS PRL paper can be used as a template.

7. There is no "conservation of mass"!

8. We should not reference internal CLAS notes, which may not be available to readers.

9. Many people use error and uncertainty interchangeably – this is wrong.

10. When the dips in Fig. 4 are discussed, it seems like our data is consistent with the models; why was the term "surprising" used. Also, is the first dip around 0.6 or 0.9 GeV^2? The figure suggests 0.6GeV^2, but the text refers to 0.9-1.2 GeV^2. Are we missing something here?

11. What are the largest contributions of the systematic uncertainties? Values? How were they determined? They should be discussed.

12. The paper ends with “favor Regge pole model and quark counting rule while disfavoring…”. Is this not only true for certain kinematic regions? For sure, the counting rule is not valid for theta not around 90 degrees. Also the paper stressed the importance of meson photproduction for nucleon’s QCD models. However, it made no real discussions about how this is true (a few more references at least would help), and explain why the “Reggie” regime is necessary – one can make a case for that, but it does seem to have been made in the paper. English needs improvement

A few detailed comments in red.

Abstract:
...the exclusive pi0 photoproduction cross section via Dalitz decay and e+e- pair conversion mode on a hydrogen target in a wide kinematic range…

The final state pe+e-X(gamma) was measured after interaction of the tagged photon beam over an energy range spanning the “resonance” to “Regge” regimes, i.e. E=1.25-5.55GeV.

-we are not sure if this sentence fits an abstract:

The final state particles p, e +, e − were detected while the photon was not detected. The π 0 is identified by analyzing the missing mass of proton.

This new data quadruples the world database above E = 2 GeV. Our data appear to favor the Regge pole model and the quark counting rule while disfavoring the Handbag model.

Is this strong enough for PRL? They require something novel/high impact and of general interest. It could be that the measurement via e+e- is novel, if so this should be emphasized more.

“This experiment is a unique opportunity to bridge resonance and high-energy, in particular...” is this true?

“The model of Laget is presumably (the authors should know!) valid within the full angular range($\theta = 0^\circ - 180^\circ$) [5] while the others are good for different ranges of the forward direction, *i.e.* from $|t| = -t$ min at $\theta = 0$ to $\theta = \pi/2$, where t is the squared four-momentum transfer.” We do not understand this; also you should not change from degrees to radians mid stream.

“for the full CLAS energy range, i.e. E> 2.8 GeV” surely there is an upper limit!

First paragraph page 2 ??

Second paragraph – need to combine first 2 sentences, don’t need previous and existing “and

subsequent Dalitz decay” it is not subsequent to conversion reactions.

“Lepton identification was based on conservation of mass.” ?was it?

Notes : More recent Mainz results going up to W=1.9GeV should be from Aldarson et al(2 of the reviewers are authors!) Also A2 not mentioned in text along with other measurements 2nd last paragraph page 2

@article{adlarson2015measurement,
title={Measurement of π 0 photoproduction on the proton at MAMI C},
author={Adlarson, P and Afzal, F and Akondi, CS and Annand, JRM and Arends, HJ and Azimov, Ya I and Beck, R and Borisov, N and Braghieri, A and Briscoe, WJ and others},
journal={Physical Review C},
volume={92}, number={2}, pages={024617}, year={2015},
publisher={American Physical Society}
}

Kinematic fitting, is a confidence level cut applied? How does fig2 correspond to KinFits?

See fig 16 in Analysis note CL>1% on 1C and <1% on 4C + 75MeV Mx(p) cut . Should be detailed in paper. Actually also looks like 2C cut ** We think it is technically incorrect to do this. The 2C fit is essentially a cut on the invariant mass, this means you cannot reliably constrain the background under the peak from the fit. As the background is small the effect may be small.

Might be better to show the Eg>3.6 Fig 2 as you can actually see the background function Why 1C and 2C rather than just 2C?

Systematic Uncertainties, relatively contributions should be made clearer i.e. in a table

"tagged JLab CLAS g1c measurements" g1c is not meaningful "previous CLAS measurements with Ee=XGeV"

Page 3 right para 1 : " In general the Regge approximation becomes less applicable below 3GeV and we focus mainly above this region here"

Fig 3-4 the models need further elaboration. At least author or model nickname given in caption.

"The dip around |t| = 0.9 − 1.2 GeV 2 " is not particularly clear in the plots, We think you need to zoom in. Also it is not clear if this is referring to data or models. Also the higher energy results Phys. Rev. D4 (1971) 1937.

"This is surprising since there was no previous indication of this dip" apart from the models!

"The Regge model predicts nonsense, wrong signature zeroes,where the Regge trajectories cross negative even integers.For the dominant vector meson Regge poles, these dips should appear at approximately −t = 0.6, 3.0, 5.0 GeV 2 ,which agrees with the data." This should be referenced to the applicable model(s). Actually the following paragraph seems to go into more detail, but again it seems specific to 1 model, probably don't need this paragraph as well

"That is why it is also important..." what exactly is that? Perhaps important->necessary "Simultaneously, Fig. 5 shows..." is fig 5 really used before here?

"A significant increase in the comprehensiveness of the database for observables in the meson photoproduction process is critical to reaching definitive knowledge about QCD-based models of the nucleon. Studies that cover a broad range of c.m. energy s are particularly helpful in sorting out the phenomenology." Remove this paragraph or move it to introduction.