Report :

The paper appears to be OK and could be useful to the CDF and D0 collaborations for excited lepton searches.

>> Thank you. Indeed, these results have already proved useful to both collaborations.

However, I found aspects of the writing sloppy and would like to see the authors clean the paper up before publication.

>> By request we have added significantly to the explicitness of the text, equations, figures and tables. We hope this adequately answers the reviewers criticisms. See below.

In particular:

1. It is hard to understand eqn 3. The authors should define the symbols in the equation.

>> We agree. The paragraph preceding eqn. 3 now reads:

" To maximize our sensitivity we assume, for simplicity, that taking a set of data selection requirements (cuts) which minimizes the expected cross section limit at 95% confidence level, sigma_{95}^ exp, also maximizes our sensitivity for discovery. To calculate the expected limits, we use the signal acceptance and background estimates from the simulations above, each taken with 10% systematic error, and assume a single detector for two scenarios: 2 fb -1 and 15 fb -1 of luminosity, taken with 5% systematic uncertainty. If there is no signal in the data the limit is uniquely determined by the number of events observed in the data, the acceptance, the expected background rate and the sample luminosity. We use a frequentist method to incorporate the errors and assume that all errors on acceptance, background and luminosity are uncorrelated. Said differently, the limit is a function of only the cuts and the number of events observed in the data, N, and can be written as sigma{95}(N,cut). With the assumption of no observed signal, N fluctuates around the mean number of expected background events, M, according to Poisson statistics. In this way we estimate an average expected cross section limit as a function of each cut, sigma_{95}^{avg} (cut). Specifically:"

2. I see no reference to table II in the body of the paper. Perhaps I am missing it but could the authors have a look at this and add some reference and description to Table II in the text.

>> Thank you for catching this. Upon further consideration, we decided that Table I was superfluous and we got rid of it. Now the table that you were talking about is referenced in the ‘‘We have studied...’’ paragraph on page 4. We have also added to the table’s caption. The last sentence in the aforementioned paragraph now reads:

‘‘Both results are shown in Fig 6 and the 2 fb -1 results are tabulated in Table I, along with more detail about the optimal cut values, final acceptances and expected backgrounds for each.’’

3. Some further explanation of eqn 4 and 5 would be helpful.

>> Agreed. There was also a typo in equation 5 (now 6), which has been fixed. The paragraph before these equations now reads:

``In order to set more general limits on the excited lepton production, we use the Feynman rules for the Lagrangian in Eqn.~2 (since single production dominates for all values of f/Lambda of interest) which give a simple relation between cross-section limits and f/Lambda for signal. Specifically, we find,"

(Lambda_{1})^2 sigma(f/Lambda_{1},M_{e*})
=(Lambda_{2})^2 sigma(f/Lambda_{2},M_{e*})

Using this equation, numerical values of the cross-section limits sigma_{95}^{exp}, and f/Lambda = 10^-2 GeV^-1 (for which sigma_{95}^{ exp} was calculated), we find,

(f/Lambda) ^2 = sigma_{95}^{exp}/10^4 sigma(10^-2,M_{e*})

4. In fig 3 the caption is not nearly descriptive enough. What do the various figures correspond to?

>> This is a good point. We have made the caption more descriptive. It now reads:

``A comparison of the p_T distributions of the final state electrons (e_1 and e_2) and the photon (gamma_{1}) for e*e -> ee gamma and e* e* -> ee gamma production, and for standard model background processes. One can see that kinematics are well separated for large values of p_T.''

5. In fig 6 and 7 the authors only refer to 2 fb -1 in the text but in fact there are curves for 2 fb -1 and 15 fb -1.

>> Thank you for catching this oversight. We have made both the text and the figure captions reflect both choices of luminosity on a more balanced footing. The captions now read:

``The optimized expected 95% C.L. for cross section upper limits, sigma_{95}^{\ exp}, for e* -> e gamma production using the ee gamma final state. The solid and dashed lines show the results for 2 fb -1 and 15 fb -1 of data respectively.''

and

``Exclusion plot for f/Lambda as a function of e* mass. The solid shaded region and the solid line show the exclusions for 2 fb -1 and 15 fb -1 worth of data respectively.''

A final comment is that it makes me very nervous to totally rely on computer programs like COMPHEP. It has been my experience with collaborators that blindly accepting results without any cross checks is very dangerous. The numbers do not seem out of line with my experience so I've accepted the results.

>> The reviewer is correct to worry about unchecked results. However, as mentioned in the text, we have compared our results on a symbolic level. In addition, CompHEP is a well tested program for all Standard Model processes. To make sure the new model with the excited states was implemented correctly we obtained from the CompHEP the symbolic formulas for all the production cross sections of excited leptons and compared them with the known formulas from the literature and got complete agreement. In the cross channel our production process $qq-bqr -> ee* gives the production process at HERA, and we have also compared the formulas in this case with the known ones for HERA obtained by F.Boudjema et al. Another check was a calculation in two gauges, t'Hooft-Feynman and Unitary. Once more a perfect agreement was found. We also did cross checks with formulas in e+e- and e gamma collisions since the same new interaction vertices we implemented take place for the production processes here as well. Thus we consider our results to be well checked and not a case of "blind acceptance" of ComHEP.

So, the authors should give the paper a very careful reading to consider whether the reader can follow the details. I've pointed out some places where the paper would benefit from further details but there could be other places.

>> We thank the review for their comments and have found them helpful. We have worked hard at fixing the places mentioned as well as any other additional places where the text was not descriptive enough. We hope they are pleased with the updated version.

Sincerely,

David Toback
for the authors