

Minutes of the Compositeness Group Meeting held at Sheffield

16/07 to 17/07/92

Present : Ziad Ajaltouni, Maria Bardadin, Gerard Bonneaud, Chris Booth, Fred Combley, Mike Green, Fraser Hatfield, Bernard Michel, Fabrice Podlyski, Imran Quazi.

Since all the transparencies presented were quite complete I won't attempt to re-iterate the contents. I will try only to cover the gist of the discussions. So please see the corresponding slides for details of analysis etc.. I apologise if I have unintentionally missed anything.

1) Two photon analysis (Lee Thompson)

There is good general agreement between data and Monte Carlo. A 'dip' in the 1991 efficiency at low  $\cos \theta$ , in the region 0.0-0.1 may or may not be a statistical fluctuation. A further dip in the  $\cos \theta$  of 0.75 is understood to be due to the ECAL overlap region.

It appears that the errors from using a chi-squared fitting technique are smaller than from the max-likelihood fit. It was suggested that there may have been changes in the error definition used in MINUIT and this should be checked.

2) Contact interactions (Maria Bardadin)

The analysis now includes 1991 data set. The work presented included distributions of both angular and energy variation of the cross section, although only the angular dependence will be presented as official ALEPH results at Dallas as only this has been approved at the Tuesday meeting.

There was a small discussion about the energy/cross section variation plot. The analysis has been carefully checked and Maria believes there is nothing wrong with the point with a 3.5 sigma deviation other than a statistical fluctuation.

3) Weak  $1^*$  decays (Ziad Ajaltouni)

The main variables used in the analysis are the missing energy, missing transverse momentum, acollinearity, acoplanarity and missing mass. Generally there are 2 types of cuts. One set for the low  $1^*$  mass region and another for the high mass region. The global efficiencies vary from as much as 90% to as low as 40%, depending on the channel. This is with a quite optimised analysis. It was suggested that Ziad circulated a detailed list of the event breakdown as it was not obvious what the cuts were doing. This will be done in the near future.

4)  $1^*$  radiative decay - another look at the kinematic variables.  
(Gerard Bonneaud)

There are three variables currently used to define the kinematic cuts : 1) the acollinearity, 2) the angle between the gamma and the nearest charged track and 3) The photon energy. Gerard suggested tightening the acollinearity cut and removing the other cuts altogether. This is enough to reduce the background to a minimum (lower than before) and yet still keep a good overall signal efficiency.

5)  $\mu^+\mu^-\gamma$  anomalous decays (Fraser Hatfield)

Fraser presented a nice analysis based on a theoretical model by Mike Griffiths (also in the Sheffield group) and which is based

on the Fritz-Mandelbaum model - the details of which are in the transparencies accompanied by this note.

The final sample contains 377 data events compared to 448 events predicted from KORALZ Monte Carlo. This large difference needs to be understood (recall that there is good agreement in the muon channel in the  $l^*$  analysis - 219 data events compared to 225 expected).

## 6) Discussion

Mike proposed that all notes for the Dallas conference be submitted to him by Wednesday 22nd.

There was a final discussion about future publications. The suggestion is that there be two papers, one covering the contact terms (almost ready) the other covering the excited fermions (radiative and weak decays) and of course Lee and Elisabetta's results incorporating the conversions work. The  $q^*$  channel by Terry Medcalf and the 2 photon work by Lee and Elisabetta are complete but the other channels need some work. The state of the various analyses is as follows :

i) Contact terms : almost complete though a few things need to be understood.

ii) Excited Fermions :

$q^*$	:complete		
$v^*$ radiative decays	:complete		
$v^*$ weak decays	:needs some work		*NEW*
$l^*$ rad decays	: " " "		
$l^*$ weak decays	: " " "		*NEW*
2 photons ( $e^*$ )	:complete.		

It was agreed that an outline for the excited fermions paper would be made by around the beginning of September by the Clermond Ferrand group.

Other future publications may include work on testing QED using multi-photon events and possibly the work done by Fraser (long term and after the work done by Mike Griffiths has been published).

Imran Quazi (Royal Holloway College)