Chapter 8

Conclusions

The present thesis is divided in two general parts. Therefore, the conclusions will be divided for each section.

8.1 $\mathbf{BR}(h^0 \to \tau\mu)$ in MSSM with Flavour Ansatz

It was calculated the Branching Ratio taking an Ansatz that mixes the second and third family of leptons [11]. It is found that the Branching Ratio can be within the upper and lower limits that CMS [10] stablished for the decay. Furhtermore cosntraints to the free supersymmetric paramters are found for the special case of this decay. For further extensions of the work already done in this thesis would be to supress the free parameters with other decays, specially with $\tau \to \mu\gamma$. The constraints found in the free paramters are For $\mu_{susy} < 0$

- $(-1600[GeV] \lesssim \mu_{susy} < -200[GeV]) \cup (-5000[GeV] < \mu_{susy} \lesssim -2800[GeV])$
- Restricted for $m_0 > 3500$ [GeV]
- No trilinear restriction (A0)
- No bino mass restriction (mb)
- No $tan(\beta)$ restriction

For $\mu_{susy} > 0$

- No μ_{susy} restriction
- Supression for $m_0 > 4000$ [GeV]
- No trilinear restriction (A0)
- No bino mass restriction (mb)
- No $tan(\beta)$ restriction

The error of 3 sigmas has decreased to 2.4 sigmas in one year of meditions at CMS. Therefore we are open to the possibility that the error presented were just a stadistical or technical error. However, the Ansatz with flavour violation within MSSM has shown excellent results and should not be discarded as a possible answer to the possible new physics beyond the SM in CMS.

8.2   Analysis of dimuon photoproduction in ultra-peripheral collisions

The Alice Detector allows the study of ultraperipheral collisions of heavy ions. In particular, the photoproduction of the vectorial meson J/Ψ can be studied by its decay to two muons in the front region. This works shows an excellent performance of the trigger system for UPC events in ALICE. Furthermore, the results from [38] were succesfully reproduced in this work.

This material will be used for the analysis of data for data of Run 2, since all the code needed for data extraction has to be in perfect conditions. It needs to be current with the versions of Aliroot and if any anomaly is founded should be reported. However, the extraction and analysis of data was successfull. The invariant mass found of the J/Ψ has an excellent accordance to the already reported [37] (3.096[GeV]). The importance of finding the J/Ψ is ultraperipheral collisions is remarkable, since it opens the possibility of new physics with this events. The reason of the last statement is beacuse the signals of the particles can be purified easily, since there exist no hadronic interaction.

According to STARLIGHT MonteCarlo, the contribution to the background of ultra-peripheral collisions with low p_T is generally because $\gamma\gamma$ processes. Incoherent photoproduction is not the main factor of J/Ψ photo-production. Instead, the coherent photo-production is the mainly factor of production with $\mu^+\mu^-$ decay. For future analysis, the present results are important because it gives the information about the background in ultra-peripheral collisions.