Msugra
Dileptons signals

slides by Carlos M.

Full Supersymmetry Simulation for ATLAS in DC1*

Michela Biglietti[a], Frederic Brochu[b], Davide Costanzo[c], Kaushik De[d], Ehud Duchovni[e], Ambreesh Gupta[f], Ian Hinchliffe[c], Chris Lester[b], Anna Lipniacka[g], Peter Loch[h], Else Lytken[i], Hong Ma[i], Jakob L. Nielsen[i], Frank Paige[j], Giacomo Polesello[k], Srini Rajagopalan[j], Dan Schrager[e], Georgios Stavropoulos[c], Dan Tovey[l], Monika Wielers[m]

[a]Universit di Napoli "Federico II", Napoli, Italy
[b]Cambridge University, Cambridge, UK
[c]Lawrence Berkeley National Laboratory, Berkeley, CA USA
[d]U. of Texas at Arlington, Arlington, TX USA
[e]Weizmann Institute, Rehovot, Israel

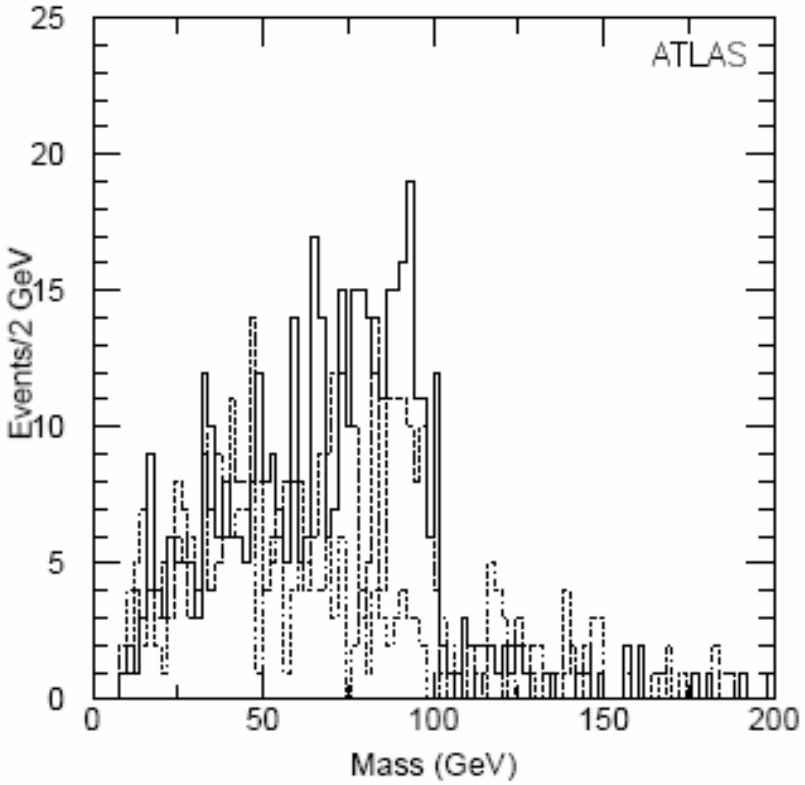
Motivation

- measure parameters describing the SUSY model chosen by Nature
- The first such quantity to be measured would likely be the ‘SUSY mass scale’ *M*SUSY
- Channel:

$$\tilde{\chi}_2^0 \to \tilde{\ell}^{\mp} \ell^{\pm} \to \tilde{\chi}_1^0 \ell^{\pm} \ell^{\mp} .$$

- 2 Neutralinos which escape the detector, producing the characteristic missing energy signature.

Three different Channels



1-> e^+e^- (dashed),

2-> $\mu^+\mu^-$(solid),

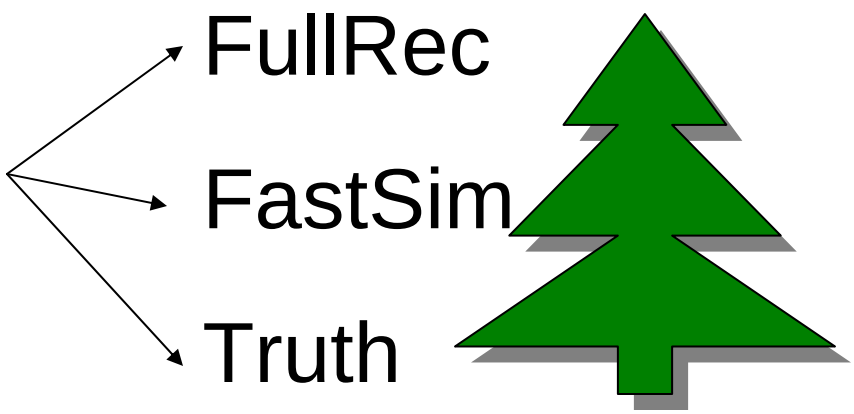
3-> $e^\pm\mu^\mp$ (dash-dot)

Invariant Mass distribution for dileptons= 1+2-3

$$M_{\ell\ell}^{\max} = M_{\tilde{\chi}_2^0}\sqrt{1-\frac{M_{\tilde{\ell}}^2}{M_{\tilde{\chi}_2^0}^2}}\sqrt{1-\frac{M_{\tilde{\chi}_1^0}^2}{M_{\tilde{\ell}}^2}} = 100.31\,\mathrm{GeV}\,.$$

Leptonic signatures

- New samples -> Ntuples

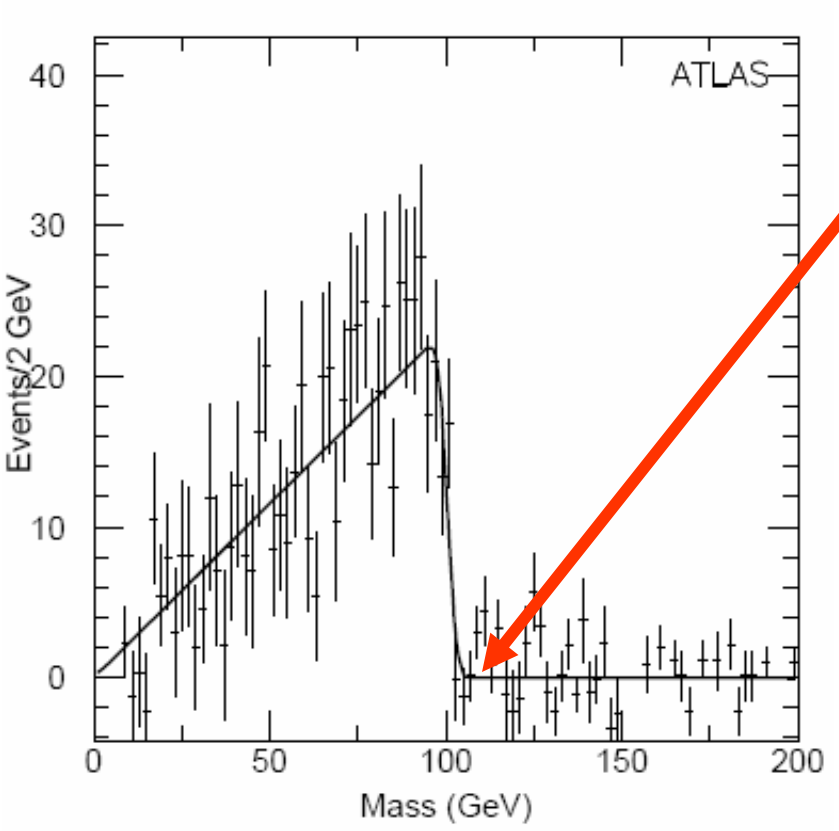


Invariant Mass= 1+2-3

$$\beta^2 M(e^+e^-) + M(\mu^+\mu^-) - \beta M(e^\pm\mu^\mp)$$

Reconstruct the invariant mass theoretical value with the NEW data from different trees

Flavor subtracted



After fitting the graph the value reconstructed is:

$$M_{\text{edge}} = 100.25 \pm 1.14\,\text{GeV}$$

Consistent with the expected value

We expect to reduce uncertainty