Squark Searches

$\tilde{t}_1 \longrightarrow$ c $\widetilde{\chi}_1^o$ $\tilde{b}_1 \longrightarrow$ b $\widetilde{\chi}_1^o$

Mass Analysis Windows : $\Delta M = M_{\tilde{q}}$ - $M_{\tilde{\chi}_1^0}$

- $5 \leq \Delta M \leq 10$: Fischer DLA, Marc Besançon (Saclay)
- $\Delta M > 10$: Neural Networks, Patrice Verdier (Lyon)

1999 Preliminary Results :

- Reasonable agreements between data and Monte-Carlo have been shown
- No excess has been seen
- $\Longrightarrow$ preliminary exclusion

Squark analysis :

Low ΔM : DLA

The same analysis as Moriond 99 + Tampere 99 :

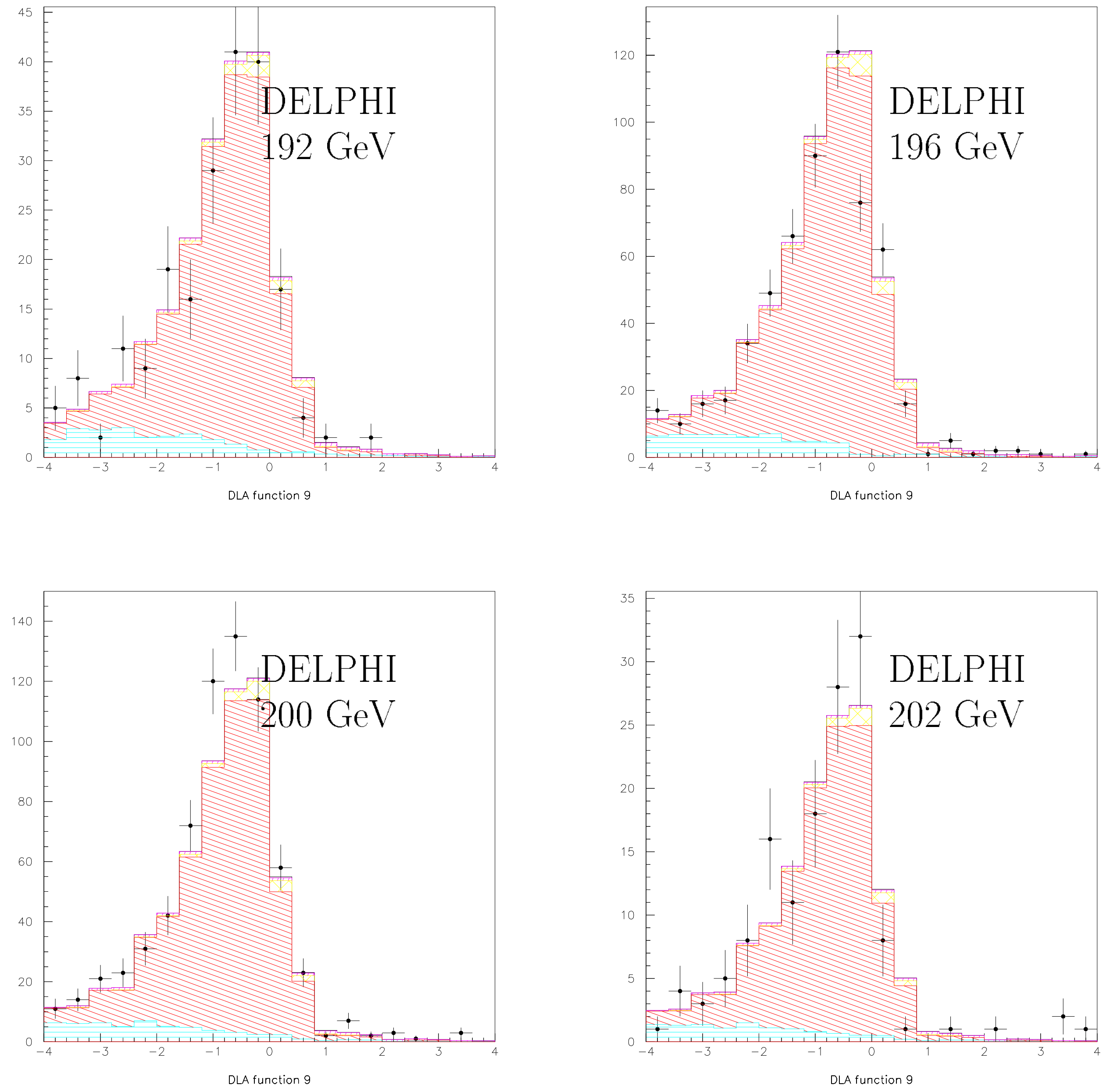
- Preselection of 2 jet hadronic events,
  to remove high energy events
  to remove $\gamma\gamma$ events
- Discriminant linear analysis based on jet,btag variables.
- A final selection to remove coplanar events.

High ΔM : NN

- Preselection of hadronic events, and to remove most of the $\gamma\gamma$ background.
- Neural networks are trained with Monte-Carlo samples at 189 GeV to separate $\gamma\gamma$, $q\bar{q}(n\gamma)$ and 4-fermions, and squark signals.
  The final selection is perfomed by a cut on the "signal" output.

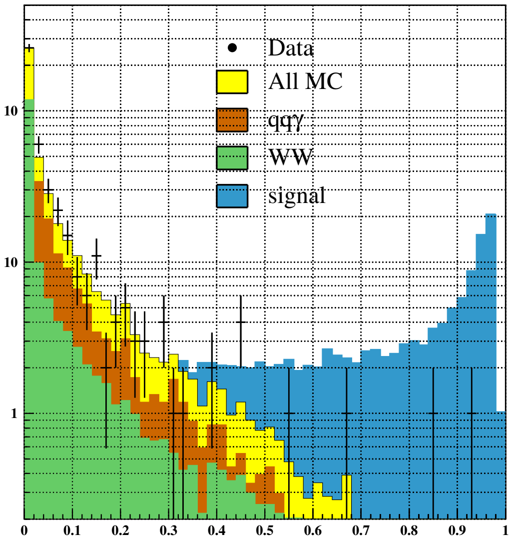
$\tilde{t}_1$: Low ΔM :

DLA outputs :

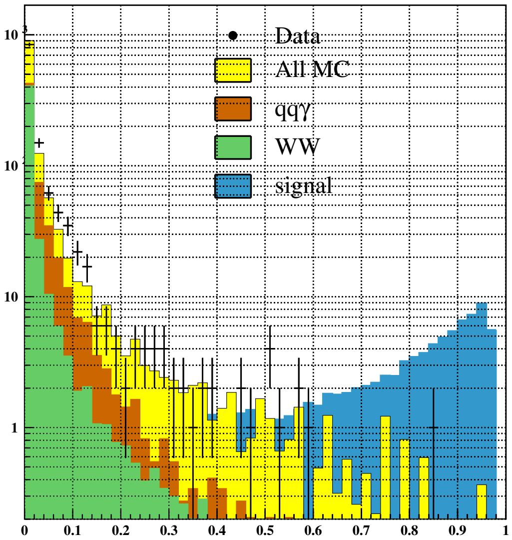


$\tilde{t}_1$and $\tilde{b}_1$: High ΔM :

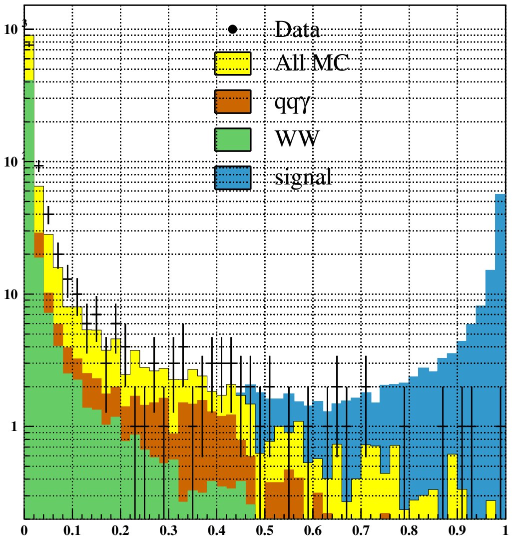
Neural network outputs :



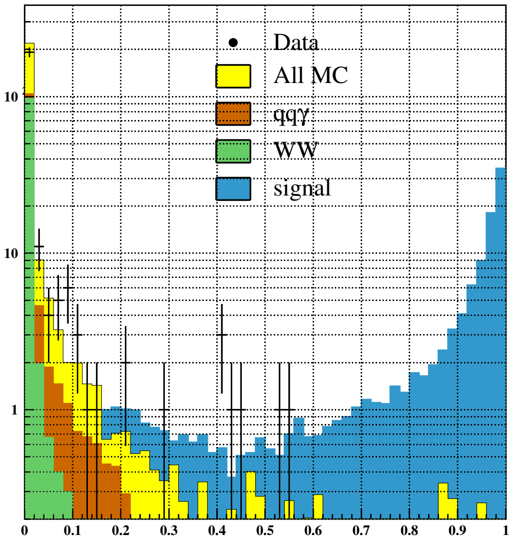
STOGDM(1)



STOMDM(1)



SBOGDM(1)



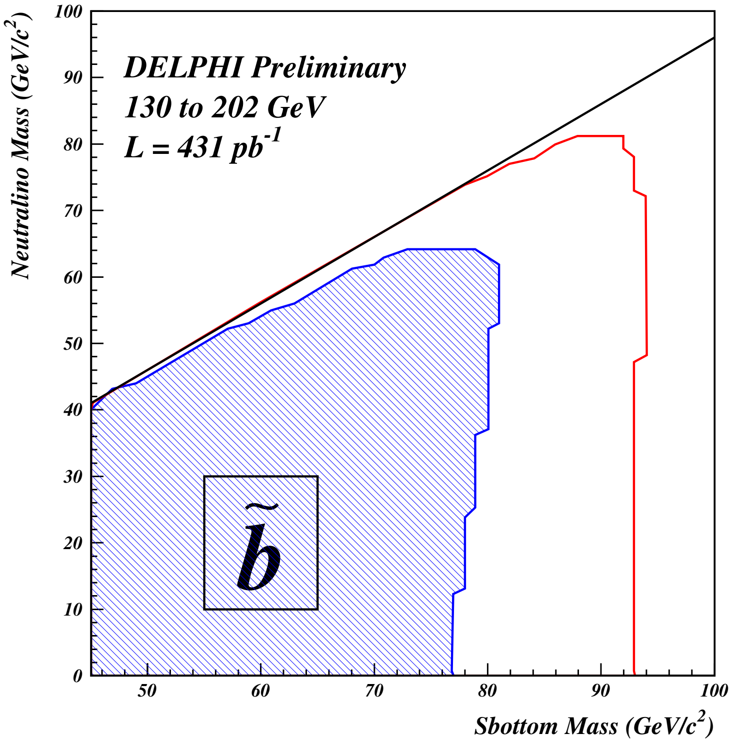
SBOMDM(1)

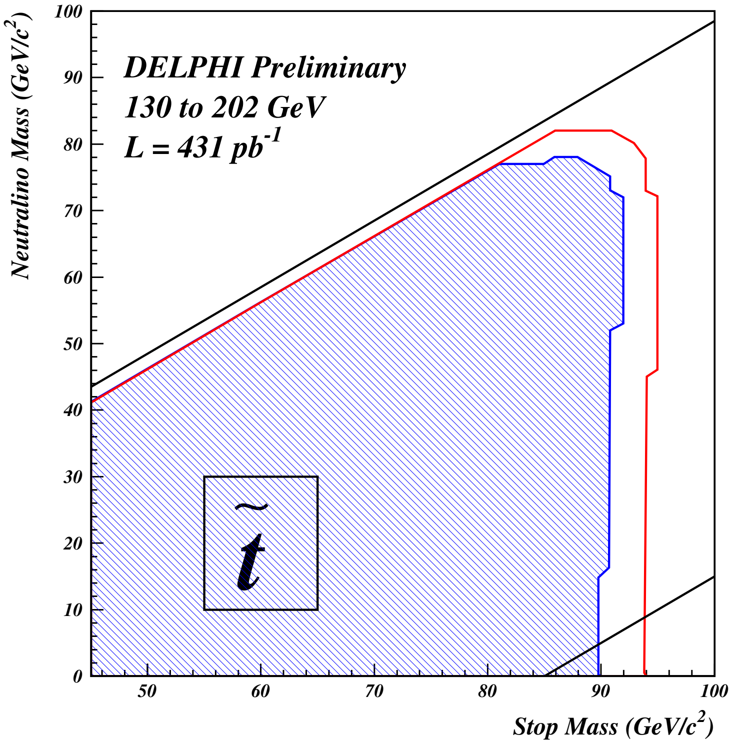
Final selections :

	sbottom			
	High ΔM		Low ΔM	
	Ndata	Nmc	Ndata	Nmc
192	1	0.70 ± 0.16	-	-
196	1	1.15 ± 0.18	-	-
200	2	1.23 ± 0.15	-	-
202	0	0.29 ± 0.04	-	-
all	4	3.37 ± 0.29	-	-

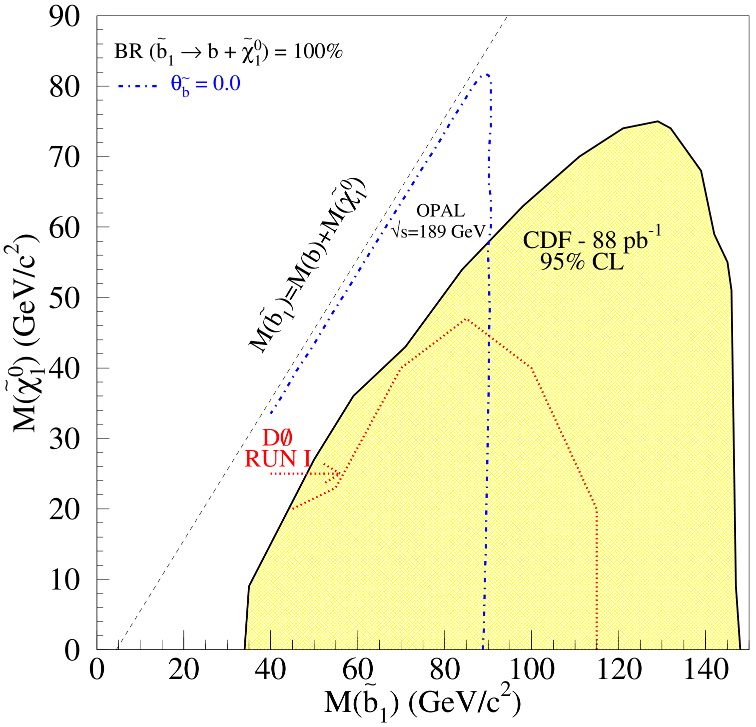
	stop			
	High ΔM		Low ΔM	
	Ndata	Nmc	Ndata	Nmc
192	2	1.05 ± 0.17	2	0.85 ± 0.28
196	0	2.78 ± 0.40	1	2.54 ± 0.84
200	1	2.61 ± 0.36	4	2.49 ± 0.82
202	1	0.60 ± 0.08	0	0.55 ± 0.18
all	4	7.04 ± 0.57	7	6.43 ± 1.22

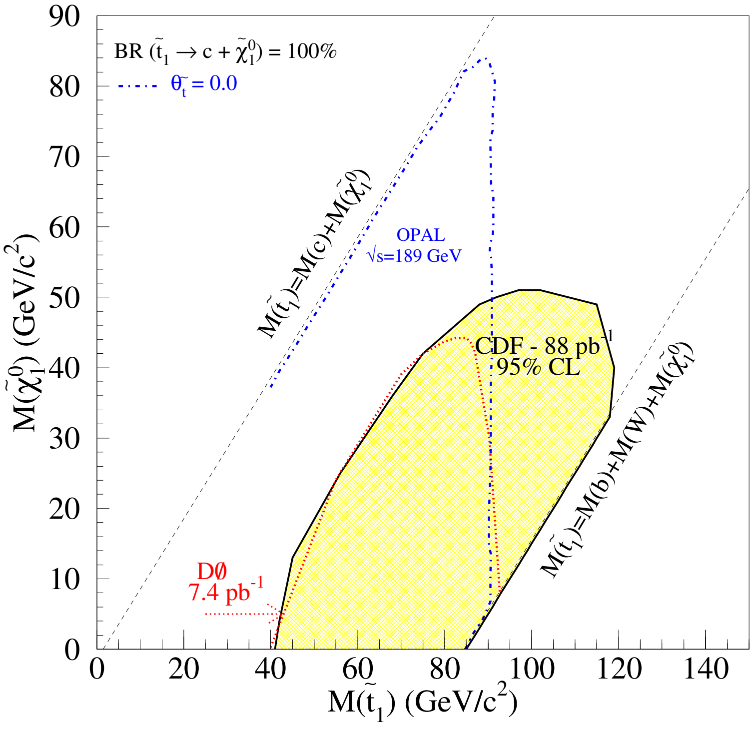
Preliminary exclusion :





CDF exclusion :





Conclusion :

Mass limits :

	$\Delta M \geq 15$		$\Delta M \geq 5$	
	$\Theta_{mix} = 0$	$Z^o decoupling$	$\Theta_{mix} = 0$	$Z^o decoupling$
Sbottom	≥ 93	≥ 77	≥ 79	≥ 48
Stop	≥ 94	≥ 90	≥ 87	≥ 82

Squark searches :

- Ultra-degenerate scenario for the stop :
  $\rightarrow 2 \leq \Delta M \leq 5$: Orsay.
- The stop hadronization will be included in SUSYGEN
- We should have a look at new signatures :
  $M_{\tilde{t}} > M_b + M_W + M_{\tilde{\chi}_1^0}$
- $\Gamma(\tilde{t}_1 \rightarrow c\ \tilde{\chi}_1^o)$ could even be equal to zero !!
  $\rightarrow$ see HEP-PH/9907428
  We already are in contact to simulate 4 body decays of the stop and to start new analysis.

$\Longrightarrow$ **http://www.home.cern.ch/~verdier/**