Introduction

LSP gluino search from $\sqrt{s} = 91.2$ to 208 GeV

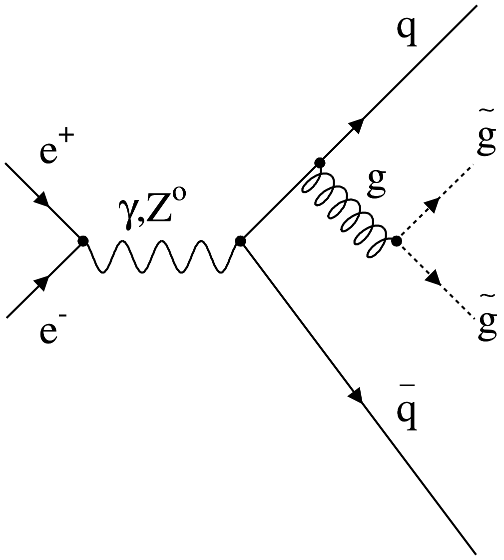
- **at LEP1:**
  - $e^+e^- \to \mathbf{q\bar{q}}\tilde{g}\tilde{g}$
    $\Longrightarrow q\bar{q}R^{\pm}R^{\pm}$, $q\bar{q}R^{\pm}R^{0}$, $q\bar{q}R^{0}R^{0}$
- **at LEP2 :**
  - $e^+e^- \to \tilde{t}_1\tilde{t}_1 \to \mathbf{c\bar{c}}\tilde{g}\tilde{g}$
    $\Longrightarrow c\bar{c}R^{\pm}R^{\pm}$, $c\bar{c}R^{\pm}R^{0}$, $c\bar{c}R^{0}R^{0}$
  - $e^+e^- \to \tilde{b}_1\tilde{b}_1 \to \mathbf{b\bar{b}}\tilde{g}\tilde{g}$
    $\Longrightarrow b\bar{b}R^{\pm}R^{\pm}$, $b\bar{b}R^{\pm}R^{0}$, $b\bar{b}R^{0}R^{0}$

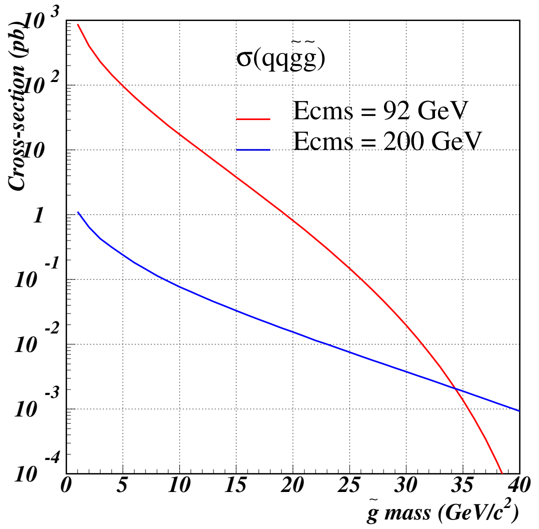
2 acoplanar jets + 2 gluino ”jets”

P=Prob($\tilde{g} \to R^{\pm}$)

LEP1 data

• R-hadron search at LEP1:



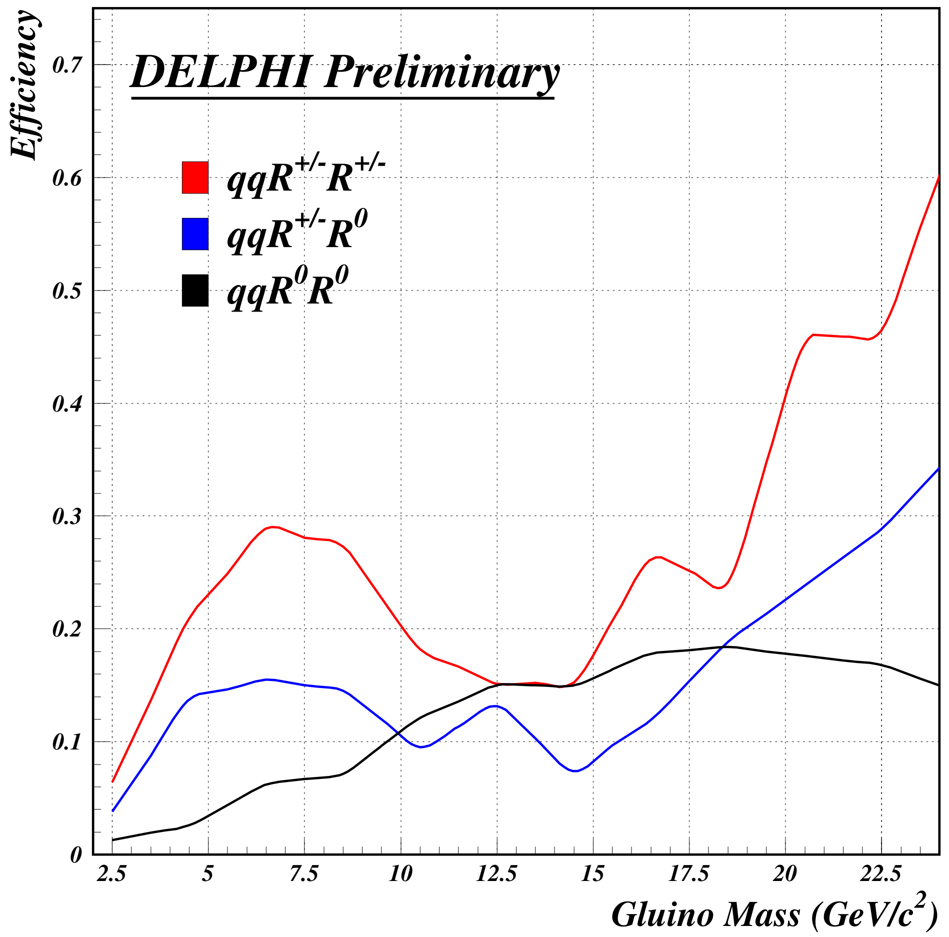


- **94C2 data** taken at $\sqrt{s}$ =**91.2** are analysed (**46.** pb^{-1})
- Background from **SH_QQPS_K94_2L_C2**
- **The** $qq\tilde{g}\tilde{g}$ **matrix element** is calculated with the program of Gunion *et al.*(**HEP-PH/9806361).**
  An interface with JETSET has been written.
  Signal events generated at $\sqrt{s}$ =**91.2** (94C2)
  from $m_{\tilde{g}}$**= 2 to 26** GeV/c^2 (**2** GeV/c^2 step)
- Ntuples are produced with **SUSANA**

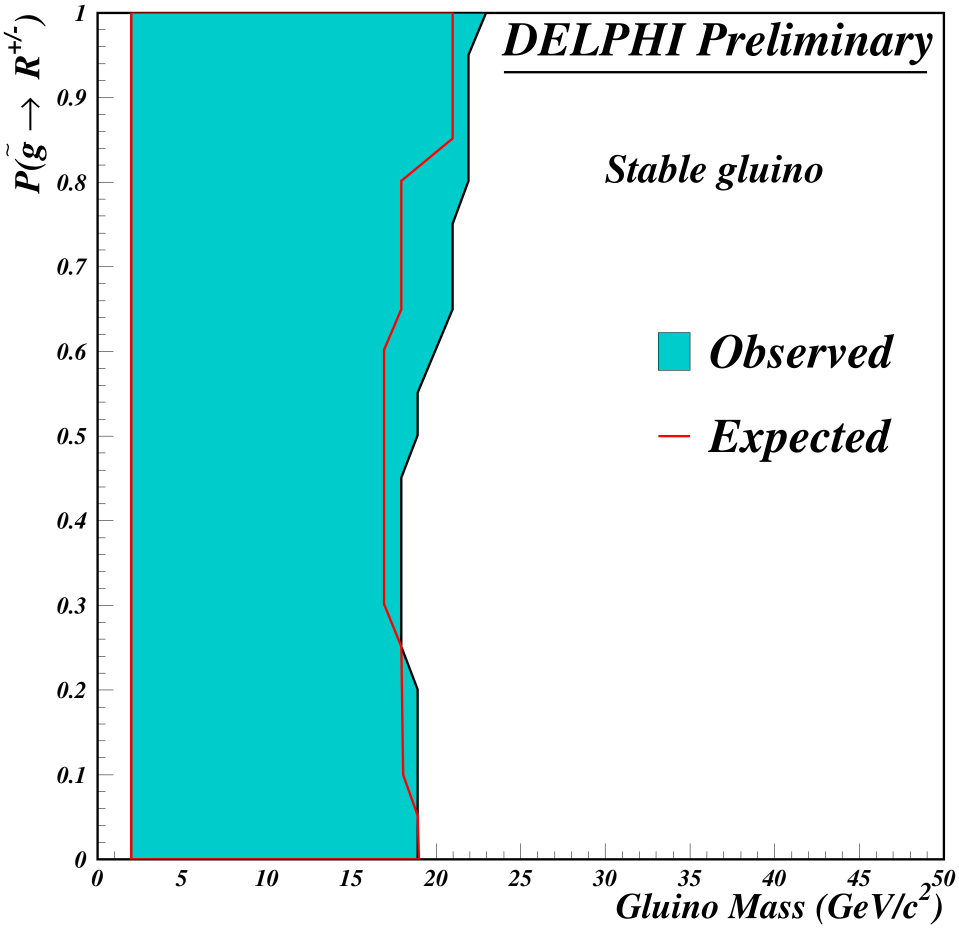
LEP1 Results

- **Looking for anomalous dE/dx :** The **same analysis** is used for $\Longrightarrow q\bar{q}R^{\pm}R^{\pm}$ **and** $q\bar{q}R^{\pm}R^{0}$
- **Sequential cuts analysis are performed to isolate** $q\bar{q}R^{0}R^{0}$ **events**

		Ndata	Nmc
Low dE/dx	$m_{\tilde{g}} < 14$	**5**	**4.2±1.3**
High dE/dx	$m_{\tilde{g}} \geq 14$	**12**	**13.5±2.4**
$q\bar{q}R^{0}R^{0}$	all $m_{\tilde{g}}$	**12**	**10.6±2.1**



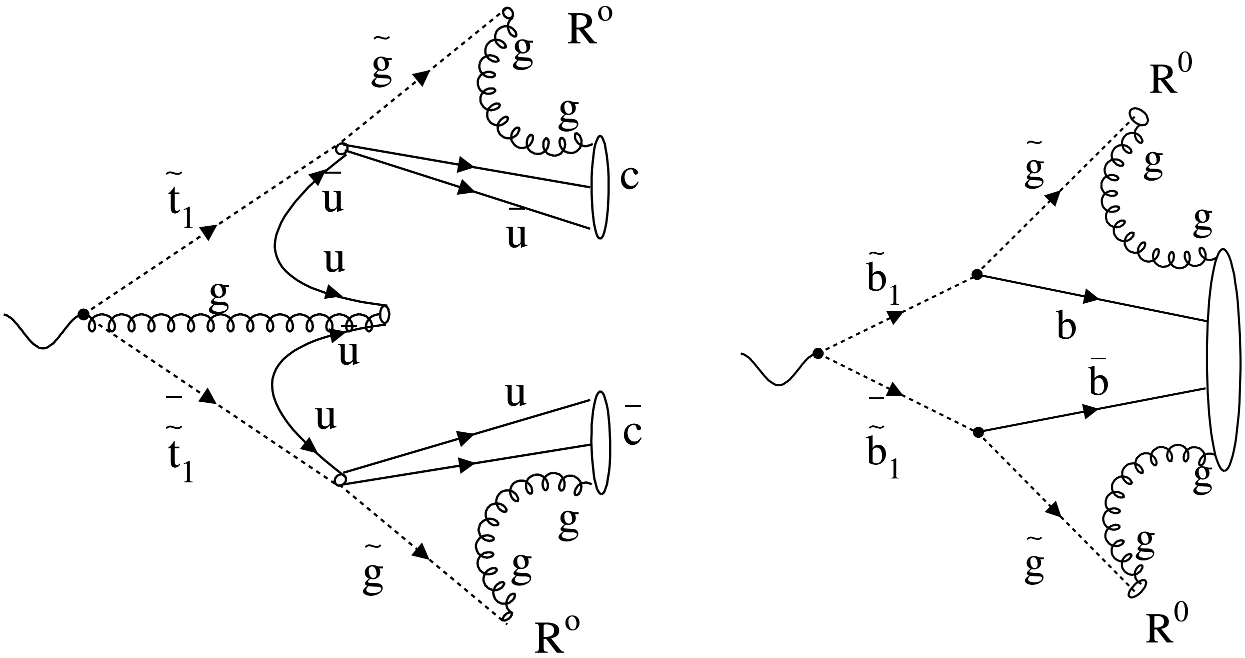
LEP1 Results



- **A stable gluino** with mass between **2. and 18.** GeV/c^2 is excluded
- This limit **does not** depend on the masses of the other sparticles

LEP2 data

- **Search for gluino from squark decay at LEP2:**



- $e^+e^- \to \tilde{t}_1\bar{\tilde{t}}_1 \to \mathbf{c\bar{c}}\tilde{g}\tilde{g}$
  - **STOPGEN generator simulates the stop hadronisation**
  - **MC samples generated at $\sqrt{s}$ =189, 200, 206 GeV**
- $e^+e^- \to \tilde{b}_1\bar{\tilde{b}}_1 \to \mathbf{b\bar{b}}\tilde{g}\tilde{g}$
  - **Modified version of SUSYGEN**
  - **MC samples generated at $\sqrt{s}$ = 200 GeV**

LEP2 data

• Search for charged R-hadrons:

- The same analysis for Stop and sbottom
- Based on anomalous dE/dx
- Combining from $\sqrt{s} = 189$ to 208 GeV:

	$q\bar{q}R^{\pm}R^{\pm}$		$q\bar{q}R^{\pm}R^{0}$	
	Ndata	Nmc	Ndata	Nmc
$m_{\tilde{g}} \leq 30$	0	0.096 ± 0.029	3	1.49 ± 0.15
$30 < m_{\tilde{g}} < 60$	0	0.003 ± 0.002	9	7.51 ± 0.38
$m_{\tilde{g}} \geq 60$	0	0.004 ± 0.003	6	6.02 ± 0.35

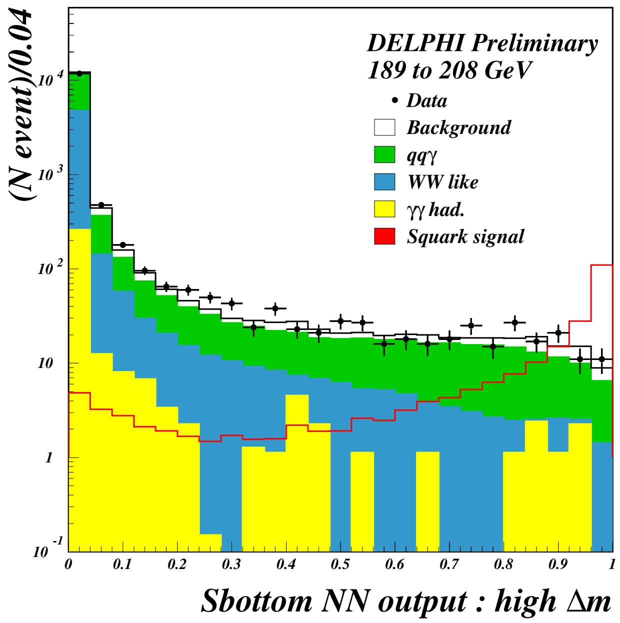
• Search for neutral R-hadrons:

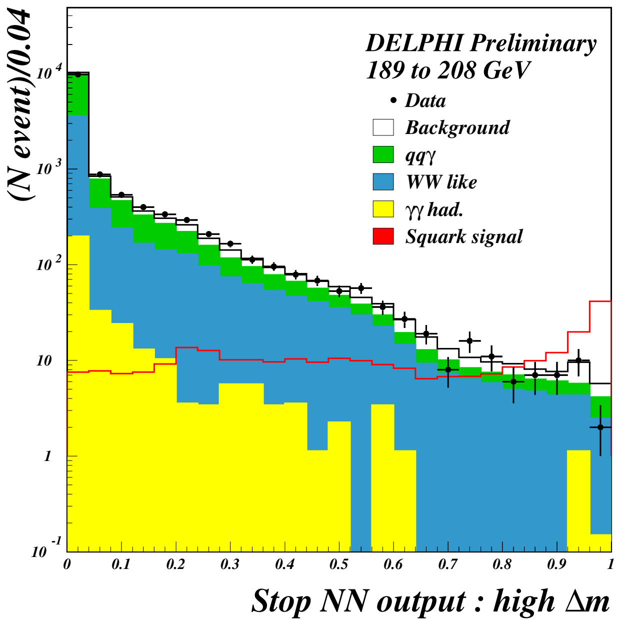
- $\Delta M \leq 20$ GeV/c^2: NN of the squark analysis $\tilde{q}_1 \to q\tilde{\chi}_1^0$
- $\Delta M > 20$ GeV/c^2: a NN is trained at $\sqrt{s}$ =200 GeV for the stop and the sbottom analysis

• E_{cha}	• acolinearity
• E_t^{ch}	• acoplanarity
• M_{vis}	• H10+H30
• Thrust	• H20+H40
• $\sqrt{s'}/\sqrt{s}$	• Prob(Z^0) 2 jets

LEP2 results

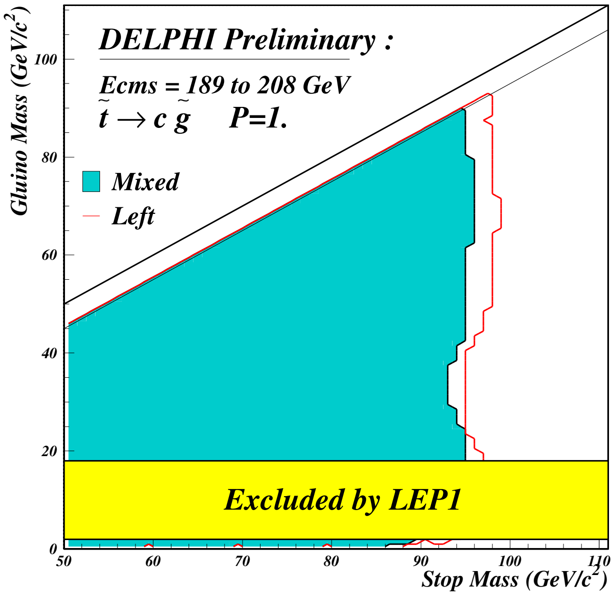
• NN outputs:

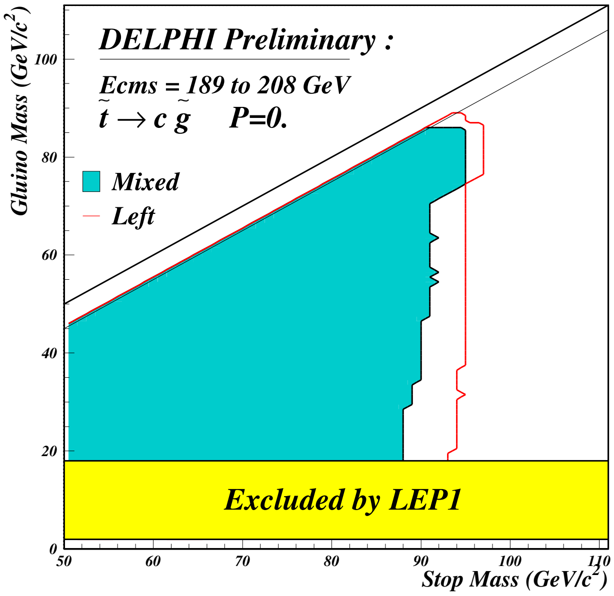


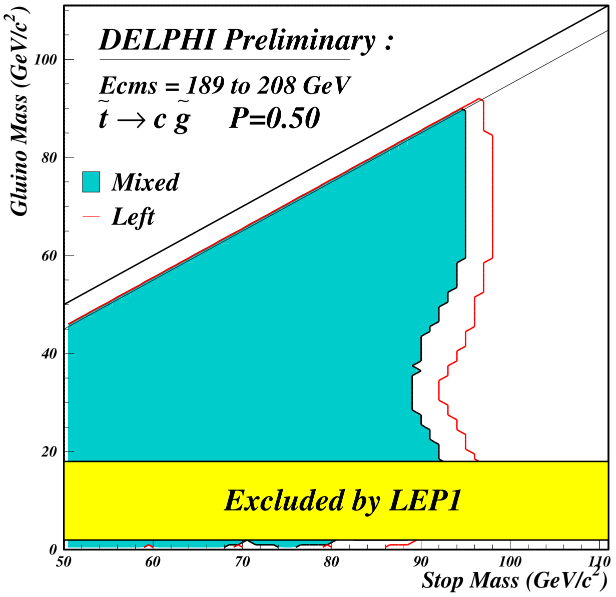


	Sbottom		Stop	
	Ndata	Nmc	Ndata	Nmc
$\Delta M > 20$	14	13.9 ± 1.1	26	29.7 ± 0.9
$\Delta M \leq 20$	2	5.6 ± 1.1	6	10.5 ± 1.3

$\tilde{t}_1$ results







$\tilde{b}_1$ results