

The R-Parity Violating MSSM at Colliders: Status Update

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(F. Garberson, A. Katz, D. Miller, B. Tweedie – Top RPV)

Motivated Benchmark Models

by Naturalness, 3rd Generation Dominance and Variety of Final States

Coupling	Production	Final States	Search	Nat.	3G
LLE122	$\tilde{g}/\tilde{u} \rightarrow \tilde{B}$	$jj + l^+l^- \mu^+ \mu^- + E_T$	Ml	X	X
	\tilde{W}	$l^+l^- \mu^+ \mu^- + E_T$	Ml	X	X
LLE233	$\tilde{t} \rightarrow \tilde{H}$	$b\bar{b}\tau^+\tau^- l^+l^- + E_T$	Ml	✓	✓
	\tilde{H}	$\tau^+\tau^- l^+l^- + E_T$	Ml	✓	✓
LQD221	\tilde{g}	$\{l^\pm jj\}\{l^\pm jj\}$	SSL	X	X
LQD321	$\tilde{t} \rightarrow \tilde{H}$	$\{b\{\tau^+ jj\}\}\{\bar{b}\{\tau^- jj\}\}$	OS τ	✓	✓
LQD232	$\tilde{g} \rightarrow \tilde{t}$	$t\bar{t}\{\mu^+ j\}\{\mu^- j\}$	Ml	X	X
LQD333	\tilde{t}	$\{\tau^+ b\}\{\tau^- b\}$	LQ	✓	✓
UDD212	\tilde{g}	$\{jjj\}\{jjj\}$	Trijet	X	X
	$\tilde{t} \rightarrow \tilde{B}$	$t\bar{t}\{jjj\}\{jjj\}$	$l + n$ jets	✓	X
UDD312	\tilde{t}	$\{jj\}\{jj\}$	Dijet Pairs	✓	X
UDD323	$\tilde{t} \rightarrow \tilde{H}$	$bb\{bbj\}\{bbj\}$	b -jets	✓	✓
LH3	\tilde{H}	$W^+W^-\tau^+\tau^-$	Ml	✓	✓

Nat. – A “natural” topology, i.e. stops and higgsinos

3G – RPV coupling compatible with a 3rd generation dominant ansatz

- ▶ All scans chosen to be linear in mass – ratios / fixed splitting

Coupling	Production	Final States	Nat.	3G
<i>LLE122</i>	$\tilde{g}/\tilde{u} \rightarrow \tilde{B}$	$jj + l^+l^- \mu^+ \mu^- + \cancel{E}_T$	X	X
	\tilde{W}	$l^+l^- \mu^+ \mu^- + \cancel{E}_T$	X	X
<i>LLE233</i>	$\tilde{t} \rightarrow \tilde{H}$	$b\bar{b}\tau^+\tau^- l^+l^- + \cancel{E}_T$	✓	✓
	\tilde{H}	$\tau^+\tau^- l^+l^- + \cancel{E}_T$	✓	✓
<i>LQD232</i>	$\tilde{g} \rightarrow \tilde{t}$	$t\bar{t}\{\mu^+j\}\{\mu^-j\}$	X	X
<i>LH3</i>	\tilde{H}	$W^+W^-\tau^+\tau^-$	✓	✓

- ▶ Multi-leptons \Rightarrow excellent for LLE, LH or some LQD signatures
- ▶ Several signal benchmarks – but one search
- ▶ These are being addressed

Resonances

Coupling	Production	Final States	Search	Nat.	3G
<i>LQD333</i>	\tilde{t}	$\{\tau^+ b\} \{\tau^- b\}$	LQ	✓	✓
<i>UDD212</i>	\tilde{g}	$\{jj\} \{jj\}$	Trijet	✗	✗
	$\tilde{t} \rightarrow \tilde{B}$	$t\bar{t} \{jj\} \{jj\}$	$\ell + n$ jets	✓	✗
<i>UDD312</i>	\tilde{t}	$\{jj\} \{jj\}$	Dijet Pairs	✓	✗

- ▶ There are volunteers to work on these

No where to go...

Coupling	Production	Final States	Search	Nat.	3G
$LQD221$	\tilde{g}	$\{\ell^\pm jj\}\{\ell^\pm jj\}$	$SS\ell$	X	X
$LQD321$	$\tilde{t} \rightarrow \tilde{H}$	$\{b\{\tau^+ jj\}\}\{\bar{b}\{\tau^- jj\}\}$	$OS\tau$	✓	✓
$UDD323$	$\tilde{t} \rightarrow \tilde{H}$	$bb\{bbj\}\{bbj\}$	b -jets	✓	✓

- ▶ These topologies have no where to go
- ▶ Need an experimentalist to treat them

- ▶ Sorting through technical issues for generation
 - ▶ Switching machinery to pythia
- ▶ Some *.root files are done now
- ▶ Should have *.root files for all by end of week