Categorizing pMSSM models for 13TeV runs

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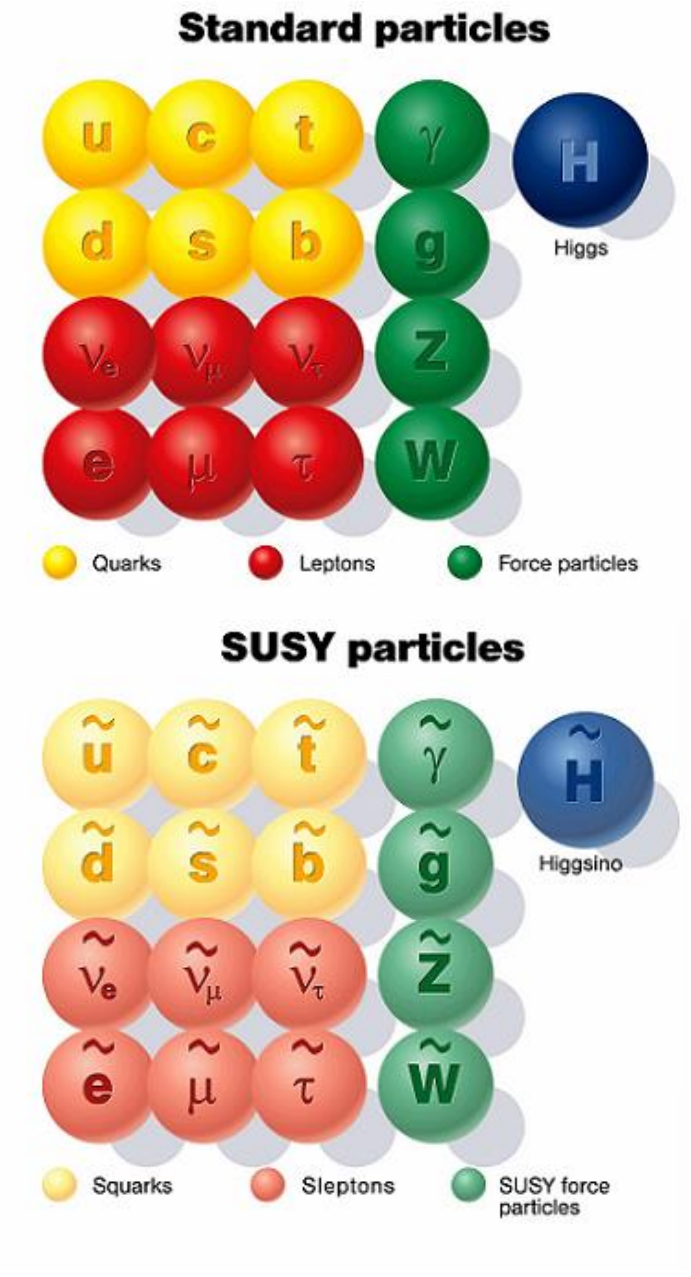
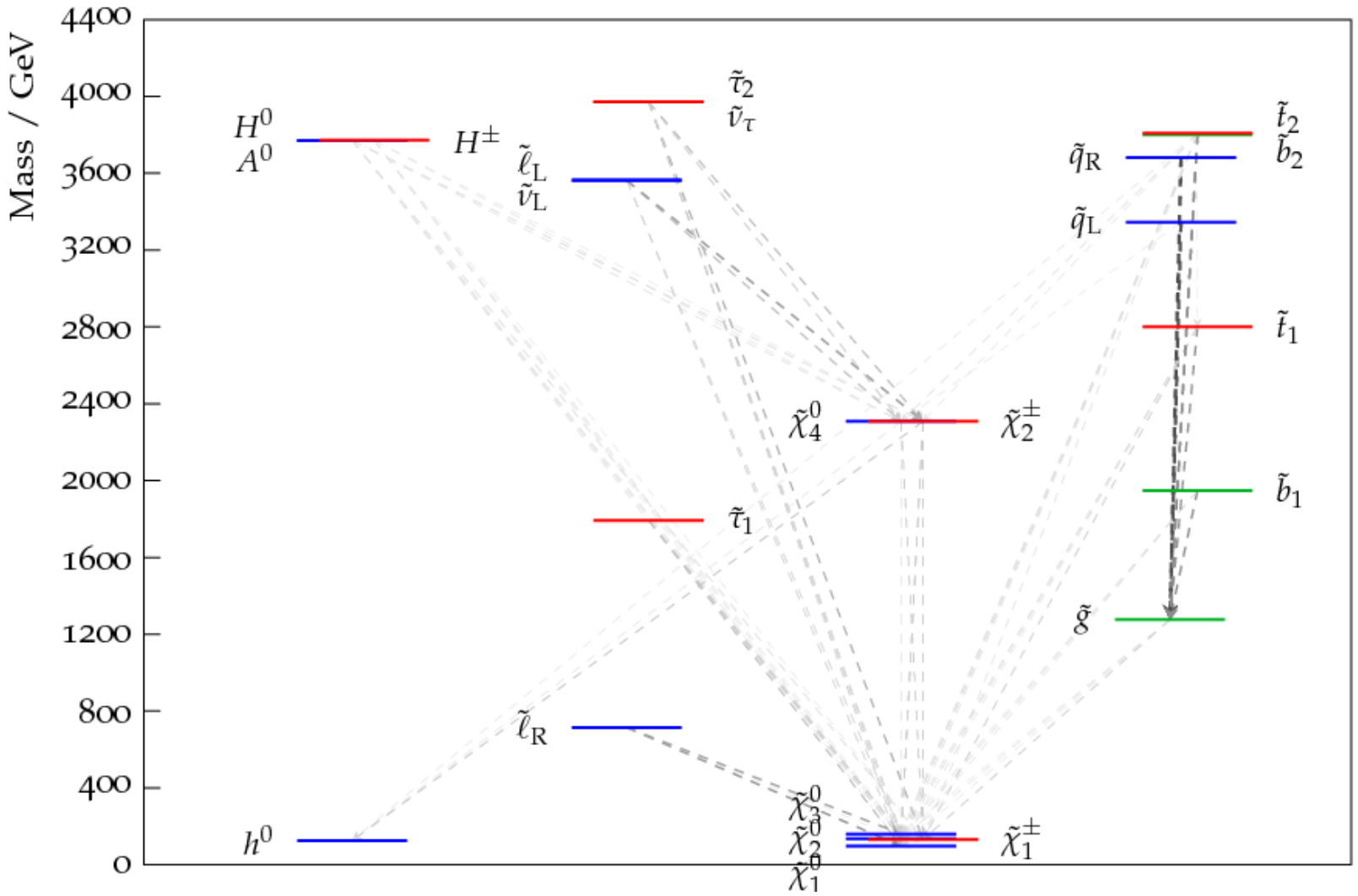
What is pMSSM?

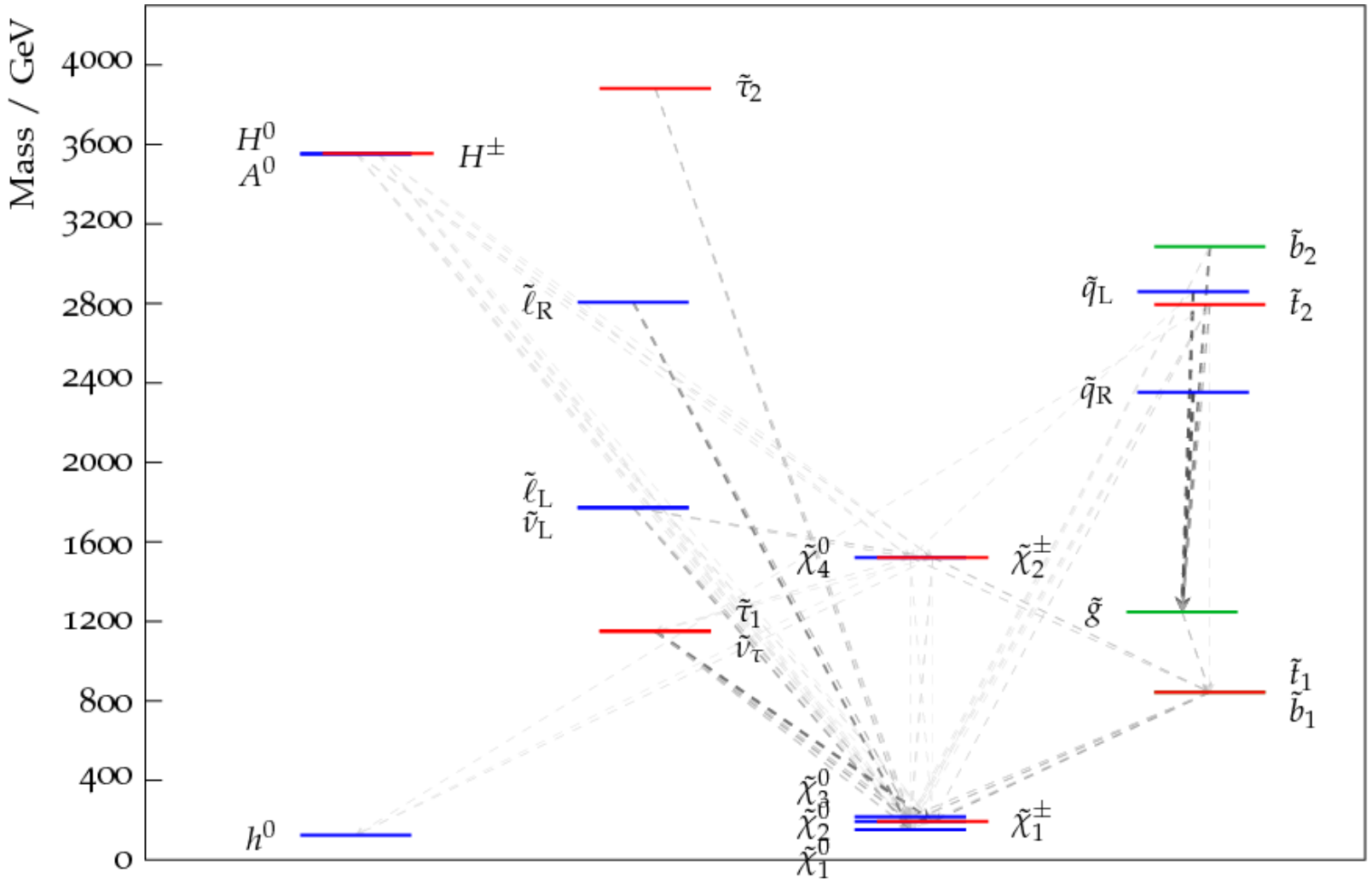
- (Phenomenological) Minimal Supersymmetric Standard Model
  - Includes minimum number of new particle states and interactions
  - (p) reduces >100 parameters to 19
- Specific models:
  - LSP is the lightest neutralino
  - R-parity conserving
    - LSP as dark matter candidate



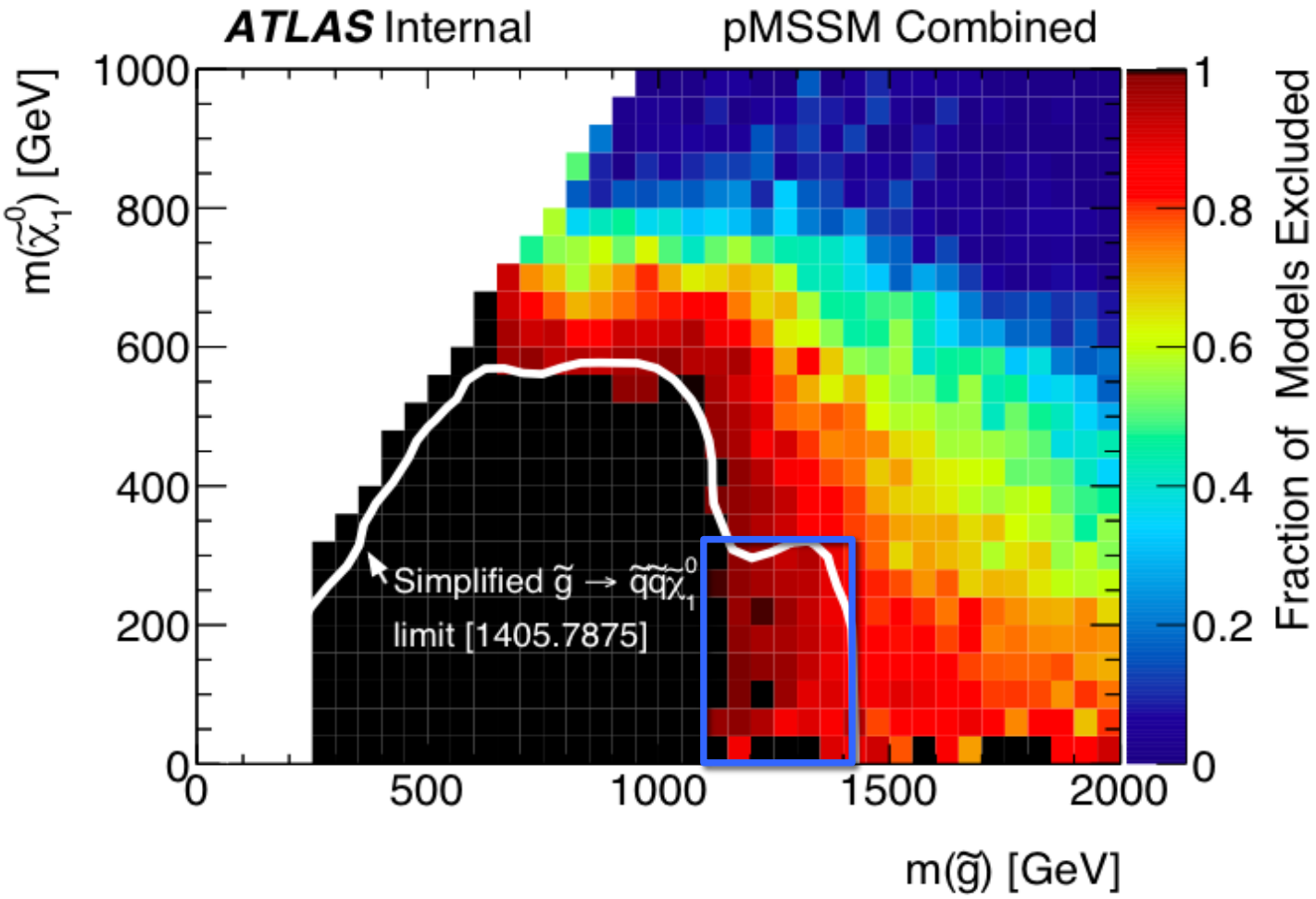
Models


Mass / GeV
4400
4000
3600
3200
2800
2400
2000
1600
1200
800
400
0
H^0
A^0
$H^\pm$
$\tilde{\tau}_2$
$\tilde{\nu}_\tau$
$\tilde{\ell}_L$
$\tilde{\nu}_L$
$\tilde{\tau}_1$
$\tilde{\ell}_R$
h^0
$\tilde{\chi}_4^0$
$\tilde{\chi}_2^\pm$
$\tilde{\chi}_3^0$
$\tilde{\chi}_2^0$
$\tilde{\chi}_1^0$
$\tilde{\chi}_1^\pm$
$\tilde{q}_R$
$\tilde{q}_L$
$\tilde{g}$
$\tilde{t}_2$
$\tilde{b}_2$
$\tilde{t}_1$
$\tilde{b}_1$

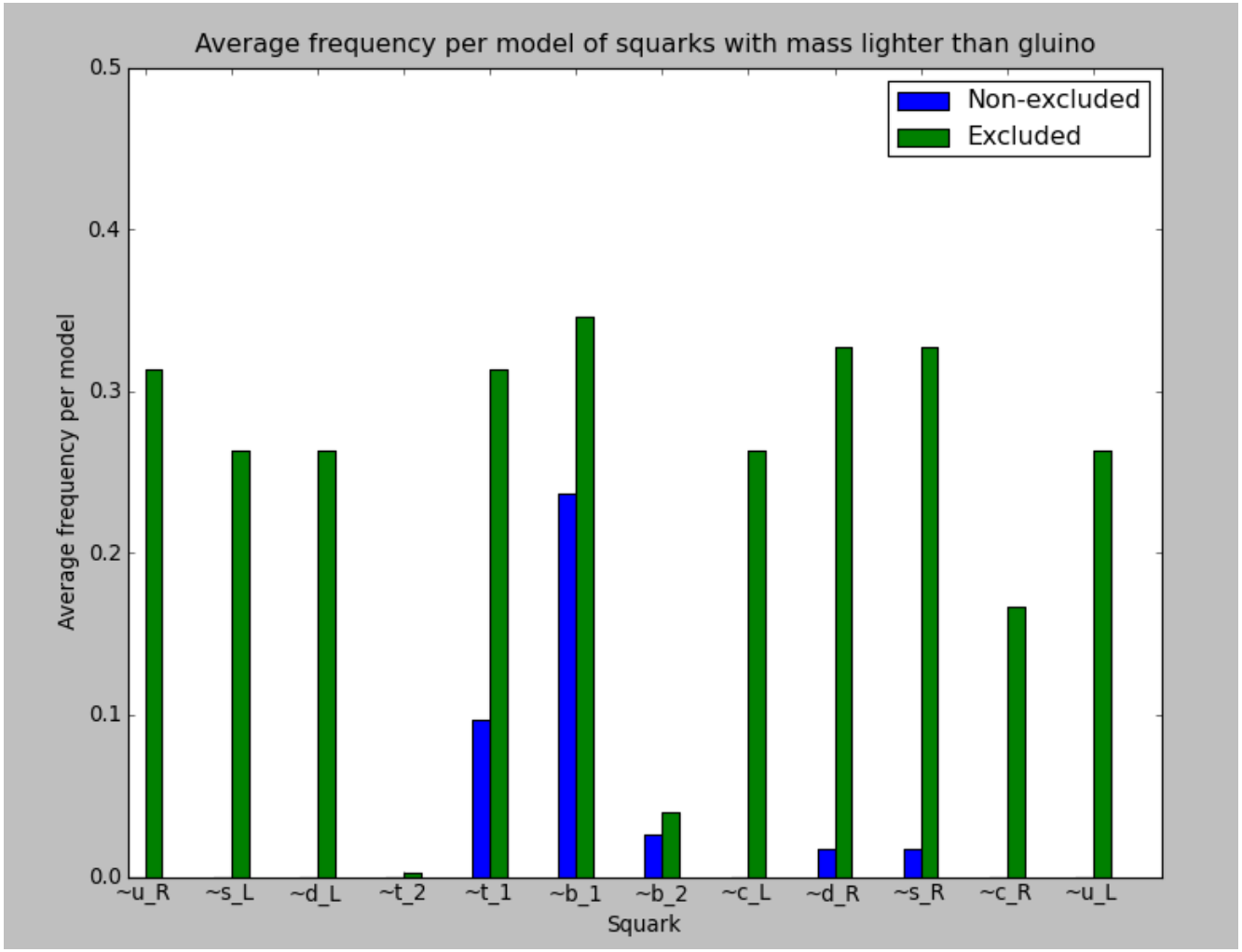
Models


Mass / GeV
4000
3600
3200
2800
2400
2000
1600
1200
800
400
0
H^0
A^0
$H^\pm$
h^0
$\tilde{\tau}_2$
$\tilde{\ell}_R$
$\tilde{\ell}_L$
$\tilde{\nu}_L$
$\tilde{\tau}_1$
$\tilde{\nu}_\tau$
$\tilde{\chi}_4^0$
$\tilde{\chi}_2^\pm$
$\tilde{\chi}_3^0$
$\tilde{\chi}_2^0$
$\tilde{\chi}_1^0$
$\tilde{\chi}_1^\pm$
$\tilde{q}_L$
$\tilde{q}_R$
$\tilde{g}$
$\tilde{b}_2$
$\tilde{t}_2$
$\tilde{t}_1$
$\tilde{b}_1$

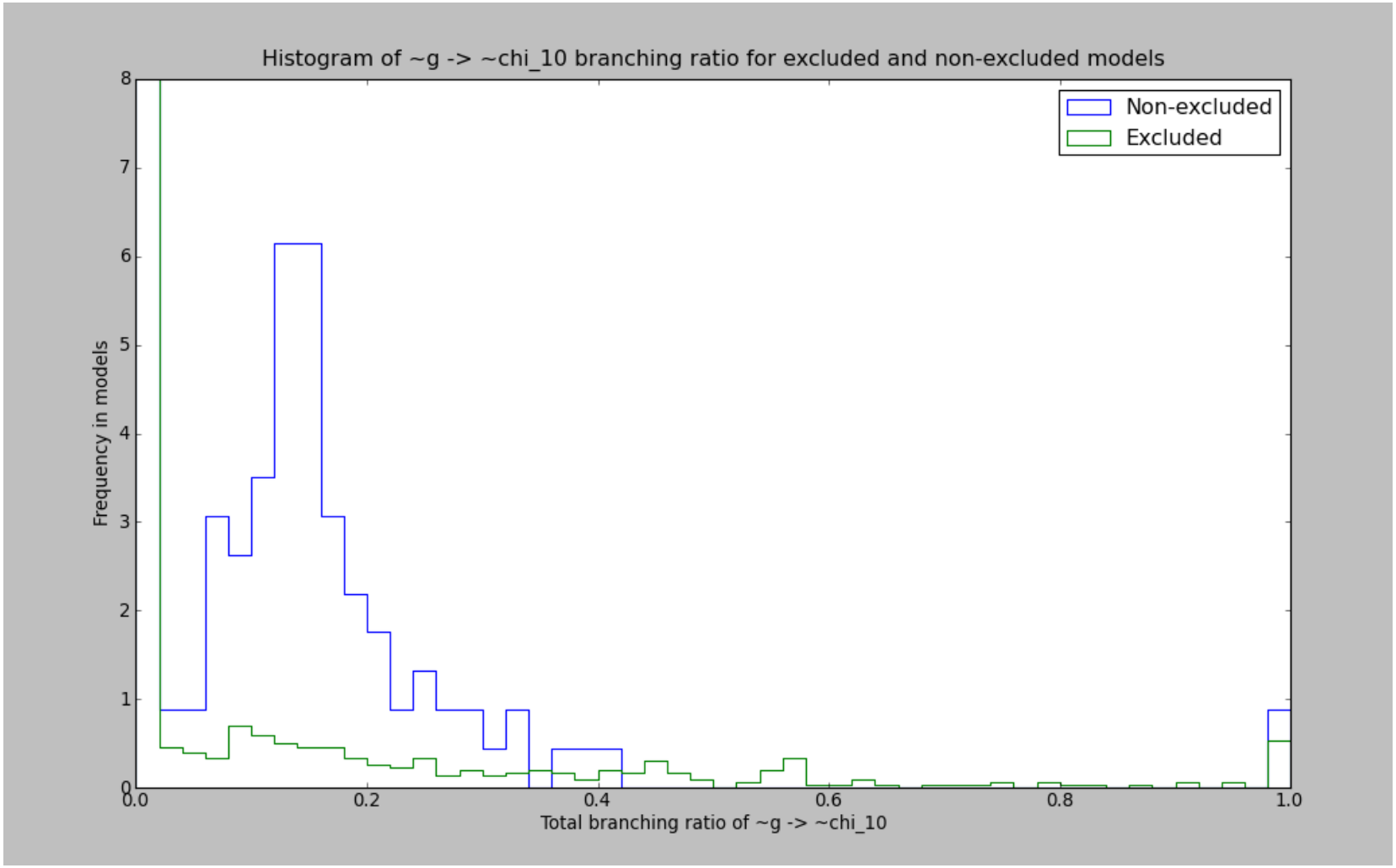
Models


ATLAS Internal
pMSSM Combined
$m(\tilde{\chi}_1^0)$ [GeV]
1000
800
600
400
200
0
0
500
1000
1500
2000
$m(\tilde{g})$ [GeV]
Simplified $\tilde{g} \rightarrow q\bar{q}\tilde{\chi}_1^0$
limit [1405.7875]
1
0.8
0.6
0.4
0.2
0
Fraction of Models Excluded

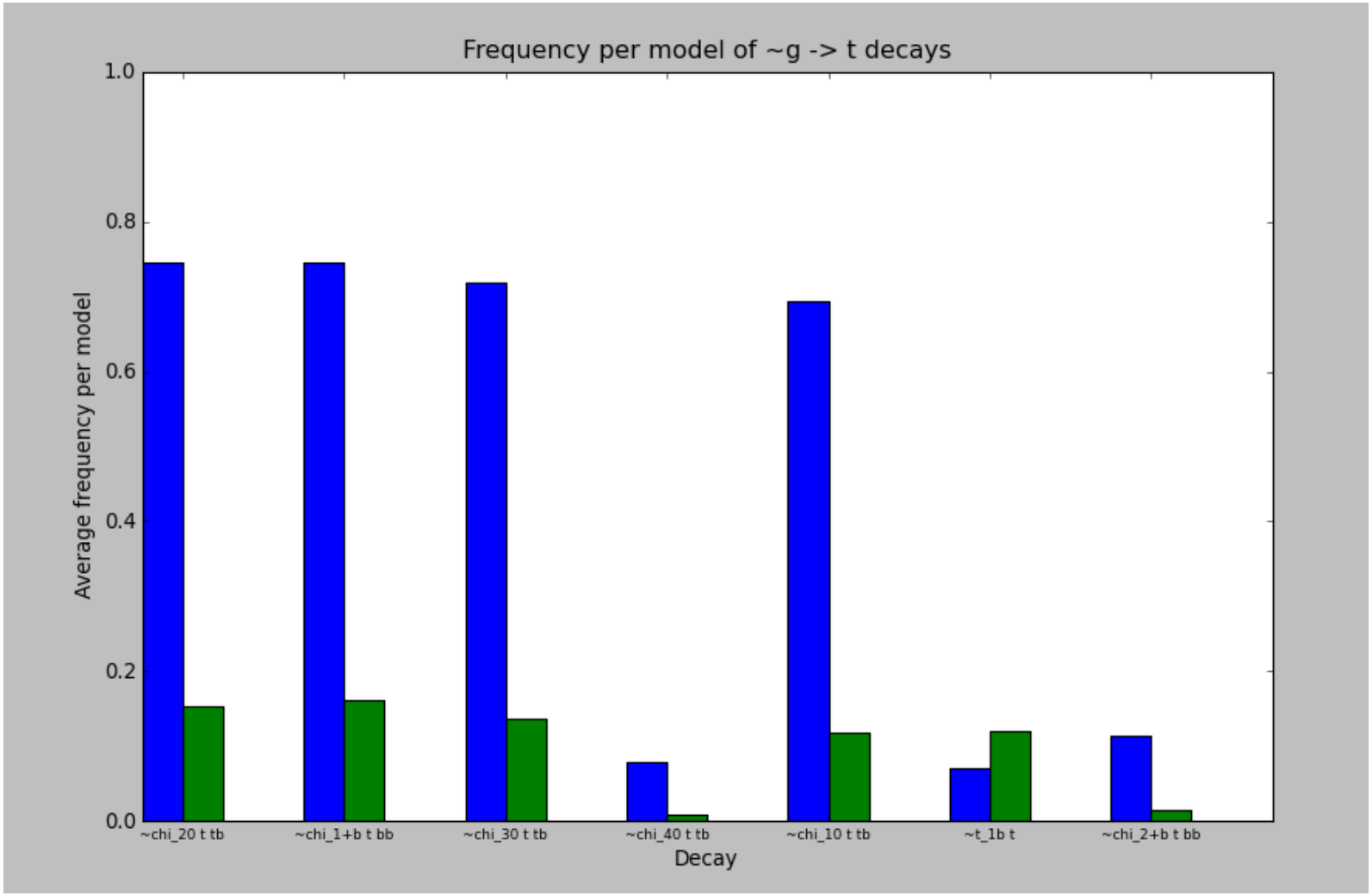
Example analysis



Example analysis

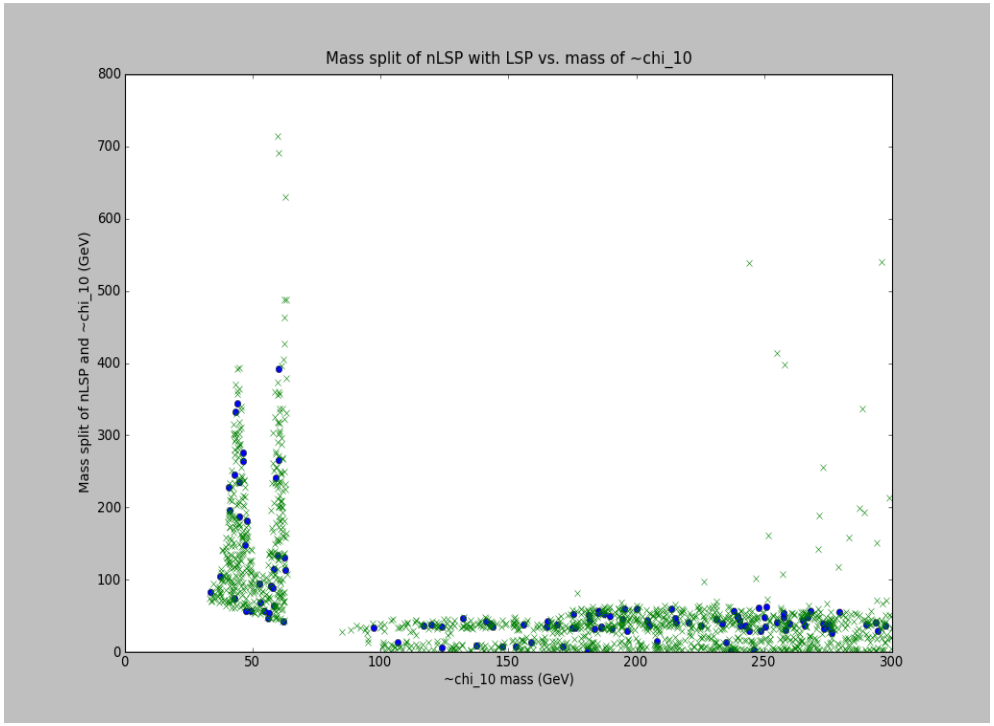


Example analysis



Ultimate goals and progress

- Generally categorize models
  - Identity of nLSP
  - Mass of LSP
  - Mass split between nLSP and LSP
- Identify differences between excluded and non-excluded models
  - Light squarks
  - Decay products of gluino
  - Branching ratios



Outside CERN