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Compilation of SUSY particle spectra from Snowmass 2001 benchmark models

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Abstract

A comparative study of supersymmetric particle spectra calculated by the programs Isajet, Susygen and Pythia is presented for various SUSY scenarios defined at the Snowmass 2001 workshop.

At the Snowmass 2001 *'Summer Study on the Future of Particle Physics'* a concensus was reached to define a list of SUSY models as benchmarks to be investigated in future collider studies. Various scenarios, so-called 'Snowmass Points and Slopes' (SPS), were proposed[1, 2] in terms of a few parameters describing 'typical' to 'extreme' R_p conserving supersymmetry breaking mechanisms of mSUGRA, GMSB and AMSB. All benchmark points respect currently existing experimental constraints.

	mSUGRA scenario	m_0	$m_{1/2}$	A_0	$\tan\beta$	sign μ
SPS 1	typical point	100	250	-100	10	+
SPS 2	focus point region	1450	300	0	10	+
SPS 3	model line into coannihilation region	90	400	0	10	+
SPS 4	large $\tan\beta$	400	300	0	50	+
SPS 5	light stop	150	300	-1000	5	+
SPS 6	non-unified gaugino masses $M_1 = 480,\ M_2 = M_3 = 300$	150	300	0	10	+
	GMSB scenario	Λ	M_{mess}	N_{mess}	$\tan\beta$	sign μ
SPS 7	NLSP = $\tilde{\tau}_1$	40,000	80,000	3	15	+
SPS 8	NLSP = $\tilde{\chi}^0_1$	100,000	200,000	1	15	+
	AMSB scenario	m_0	$m_{3/2}$		$\tan\beta$	sign μ
SPS 9	small $\Delta m(\tilde{\chi}^+_1 - \tilde{\chi}^0_1)$	400	60,000		10	+

masses and scales in GeV

However, at Snowmass it was recommended to take the SUSY particle spectrum as generated by the program Isajet[3] as the reference for benchmark models, instead of the few high energy

[1] *'SUSY benchmark discussion'* at Snowmass 2001, http://lotus.phys.nwu.edu/ schmittm/snowmass

[2] M Battaglia et al, *'The Snowmass points and slopes: benchmarks for SUSY searches'*, Snowmass proceedings, in preparation

[3] H Baer et al, hep-ph/0001086, Isajet, http://paige.home.cern.ch/paige

parameters. This arbitrary choice certainly does not imply that this program is superior to any other modern program. In fact, the purpose of this note is to compare different codes and thus to get a feeling on the reliability of presently available calculations. We present SPS model spectra, i.e. using the same input parameters, as generated by ISAJET 7.58 in comparison with results from the programs SUSYGEN 3.00/27[4] and PYTHIA 6.2/00[5]. These event generators are most popular and frequently used for SUSY studies and simulations.

ISAJET uses the package ISASUGRA to solve numerically the two-loop RGE's in the MSSM couplings in the 3^{rd} generation approximation. Theta-function thresholds are included in the gauge and Yukawa one-loop running couplings. Decay modes are calculated with ISASUSY applying decay matrix elements. Besides generic MSSM models, specific scenarios can be selected with the mSUGRA, GMSB or AMSB options.

In SUSYGEN the mSUGRA scenarios are calculated with the program `SuSpect` 2.0[6]. All masses and couplings (except scalar masses which are run at one-loop) are evaluated numerically using two-loop RGE's in the 3^{rd} generation approximation and including smooth thresholds. The Higgs branching ratios are calculated using HDECAY[7]. General models with a limited number of parameters can be chosen; GMSB and AMSB scenarios can be generated by setting the appropriate MSSM parameters.

PYTHIA is a fast and robust program and uses semi-analytical formulae to solve the RGE's with one-loop beta functions. Thresholds are not included. Several SUSY models such as mSUGRA or fixed gaugino masses can be chosen. GMSB and AMSB scenarios can be realised via generic MSSM parameters.

In general all three programs provide mass spectra which agree at the level of about 10 % for not too extreme choices of parameters. However, huge mass differences of up to factors of 2 or even more may occur in models with very large parameters, e.g high $m_0 \gg m_{1/2}$ (SPS 2) or high $\tan\beta$ (SPS 4). Such extreme situations are very sensitive to higher order corrections, for which the programs may not be prepared. In a study of SPS model lines it was observed[8] that ISAJET exhibits mass instabilities or wiggles as a function of gaugino masses at the level of a few percent, but which may increase up to $\sim 30\,\%$ for the light chargino in SPS 3 depending on the value of $m_{1/2}$.

Another concern are the decay modes and branching ratios which are treated in the three programs with different sophistication. Some of them seem to be incomplete, e.g. missing sfermion decays into gauge and Higgs bosons and missing chargino decays into Higgs (SUSYGEN) or missing Higgs decays into supersymmetric particles (PYTHIA). Obvious problems arise due to mass differences, which may suppress or open certain decay channels. The user has to carefully examine the decay modes and possibly consult the original literature. For the Higgs sector dedicated programs like HDECAY[7] or FEYNHIGGS[9] may be used as cross checks.

We adopt a user's point of view and feel unable to judge which is the optimal code or event generator to produce SUSY particle spectra. However, if benchmark studies should be useful and should allow to do comparisons, we strongly advise the authors of future analyses to give

[4] N Ghodbane et al, hep-ph/9909499, SUSYGEN, http://lyoinfo.in2p3.fr/susygen/susygen3.html
[5] T Sjöstrand et al, hep-ph/0108264, PYTHIA, http://www.thep.lu.se/~torbjorn//Pythia.html
[6] A Djouadi et al, hep-ph/9901246, `SuSpect`, http://www.lpm.univ-montp2.fr:6714/~kneur/ suspect.html
[7] A Djouadi et al, Comp. Phys. Comm. 108 (1998) 56
[8] B C Allanach, *'Theoretical uncertainties in sparticle mass predictions'*, hep-ph/0110227
[9] S Heinemeyer et al, Comp. Phys. Comm. 124 (2000) 76

the complete list of sparticle masses and decay branching ratios which have been used. In order to reproduce the Isajet spectra with Susygen and Pythia all necessary information is given in the SPS compilations below. Besides the physical masses and branching ratios, further relevant MSSM parameters are:

MSSMA	$m_{\tilde{g}}$, μ, m_A, $\tan\beta$	gluino mass, μ, A mass, $\tan\beta$
MSSMB	$m_{\tilde{q}_{1\,L}}$, $m_{\tilde{d}_R}$, $m_{\tilde{u}_R}$, $m_{\tilde{e}_L}$, $m_{\tilde{e}_R}$	1^{st} generation squark and slepton masses
MSSMC	$m_{\tilde{q}_{3\,L}}$, $m_{\tilde{b}_R}$, $m_{\tilde{t}_R}$, $m_{\tilde{\tau}_L}$, $m_{\tilde{\tau}_R}$,	3^{rd} generation squark and slepton masses,
	A_t, A_b, A_τ	squark and slepton mixings
MSSMD	$m_{\tilde{q}_{2\,L}}$, $m_{\tilde{s}_R}$, $m_{\tilde{c}_R}$, $m_{\tilde{\mu}_L}$, $m_{\tilde{\mu}_R}$	2^{nd} generation squark and slepton masses
MSSME	M_1, M_2	gaugino masses

Keeping in mind the previous remarks, we briefly comment the main characteristics of the superparticle spectra obtained with the program codes Isajet, Susygen and Pythia. Note that there exist variants to SPS 1 and SPS 8 with $\tan\beta = 30$, leading to very similar spectra[2].

SPS 1 The spectra of this 'typical' mSUGRA scenario provided by the three programs are in remarkable agreement with each other to within a few percent. Also the decay modes are reasonably similar.

SPS 2 Most striking in this 'focus point' scenario with large $m_0 \gg m_{1/2}$ are the completely different neutralino and chargino mass spectra of all three programs. Factors of 2 with respect to some central value may easily occur. This is related to the derived values of μ which exhibit discrepancies of the same order, casting doubt on the calculations. The other sparticle masses are in reasonable agreement with each other. However, large controversies exist in the treatment of the decays. The heavy sleptons and squarks can decay via all charginos and neutralinos, which apparently do have completely different gaugino and higgsino admixtures, thus leading to different χ's in the final states. This model as a whole needs certainly more care and a better theoretical understanding.

SPS 3 All spectra of this scenario which lies on a model line into the 'coannihilation region' are in good agreement with each other. The masses differ within a few up to ten percent, some branching ratios may need to be adjusted.

SPS 4 In general the mass spectra are consistent to within 10%. But due to the high $\tan\beta$ value larger discrepancies are observed for the third generation of sleptons and squarks and for the Higgs sector of Pythia. The original purpose of this parameter choice was to provide a model with relatively light Higgs bosons. At the time of the Snowmass meeting[1] a value of $m_A \simeq 310$ GeV was supported by Isajet 7.51 and `SuSpect` 2.0 (point d'Aix 3). Meanwhile the new release Isajet 7.58 gives a considerably higher mass $m_A = 404$ GeV, probably a consequence of a new treatment of the Yukawa bottom coupling at two-loops in the RG evolution Similarly, if `SuSpect` takes into account additional radiative corrections to all squarks and gauginos, one also gets a larger value of $m_A = 354$ GeV. Thus, in this parameter space with large $\tan\beta$ the Higgs spectrum depends sensitively on the details of higher order corrections. This also explains the lowish Higgs masses of Pythia, which uses a one-loop approximation.

SPS 5 The sparticle spectra of all three programs are in general agreement. But the scalar top $\tilde{t}_1$, which should be light in this scenario, is about 20% heavier in Pythia. This leads to quite different decay modes.

SPS 6 Very good agreement among the spectra is observed, since in this mSUGRA like scenario with non-unified gaugino masses the MSSM parameters calculated by Isajet serve as input to Susygen and Pythia. Slight discrepancies occur in the branching ratios.

SPS 7 & 8 Only Isajet is able to generate genuine GMSB scenarios. Since the gravitino is incorporated, the MSSM parameters of Susygen and Pythia are adjusted accordingly. Pythia does not offer to treat $\tilde{\tau}_1$ as NLSP (SPS 7). All the masses are in agreement by construction, except for discrepancies of 5 - 20% in the heavy Higgs sector of Susygen; for the time being a more precise tuning appears problematic. Again there are some differences in the decay channels, most important are those of $\tilde{e}_R^-$ and $\tilde{\mu}_R^-$ decays in model SPS 7. The specified parameters do not fix the lifetime of the NLSP, which depends on the fundamental scale $\sqrt{F}$ of SUSY breaking. Isajet allows to set this scale, such that finite decay length distributions $c\tau \sim F^2 \cdot m_{NLSP}^{-5}$ of the NLSP can be studied.

SPS 9 An elementary treatment of AMSB scenarios is only possible in Isajet. Using the corresponding MSSM parameters the appropriate spectra can be produced with Susygen and Pythia. Again there are some inconsistent decay modes, e.g. $\tilde{e}_R^-$ and $\tilde{\mu}_R^-$ decays and, more important, the $\tilde{\chi}_1^\pm$ decays. The characteristic feature is the near degeneracy of the lightest chargino and neutralino masses, which critically determines the $\tilde{\chi}_1^\pm$ lifetime and decay modes. The present parameters give $\tau = 165$ ps ($c\tau = 50$ mm). The lifetime and proper branching ratios determine the $\tilde{\chi}_1^\pm/\tilde{\chi}_1^0$ search strategy and it is advisable to consult the literature[10].

Conclusions The three event generators Isajet, Susygen and Pythia produce consistent supersymmetric particle spectra for a wide range of commonly accepted SUSY parameters. However, severe discrepancies exist for scenarios with extreme values of parameters, *e.g.* large $m_0 \gg m_{1/2}$ in the focus point scenario SPS 2 (chargino and neutralino sector) and high $\tan\beta$ of SPS 4 (Higgs sector, 3^{rd} generation sleptons and squarks), where some particle characteristics depend sensitively on higher order corrections. Although the programs are flexible enough to be adjusted to any mass spectrum (including decay modes), it is *a priori* not obvious which program to prefer. It is the aim of the present compilation to provide detailed information and to help those who are interested to study the properties of the Snowmass benchmark models.

It's a pleasure to thank S Kraml, E Perez, W Porod and G Weiglein for useful discussions on the SPS spectra and on the manuscript.

[10] J F Gunion, S Mrenna, Phys. Rev. D 64 (2001) 075002

Contents

1 SPS 1 – mSUGRA scenario

m_0	100 GeV
$m_{1/2}$	250 GeV
A_0	-100 GeV
$\tan\beta$	10
sign μ	$+$

'typical' scenario

$$m_0 = 0.4\, m_{1/2} = -A_0$$

1.1 Spectrum & parameters of ISAJET 7.58

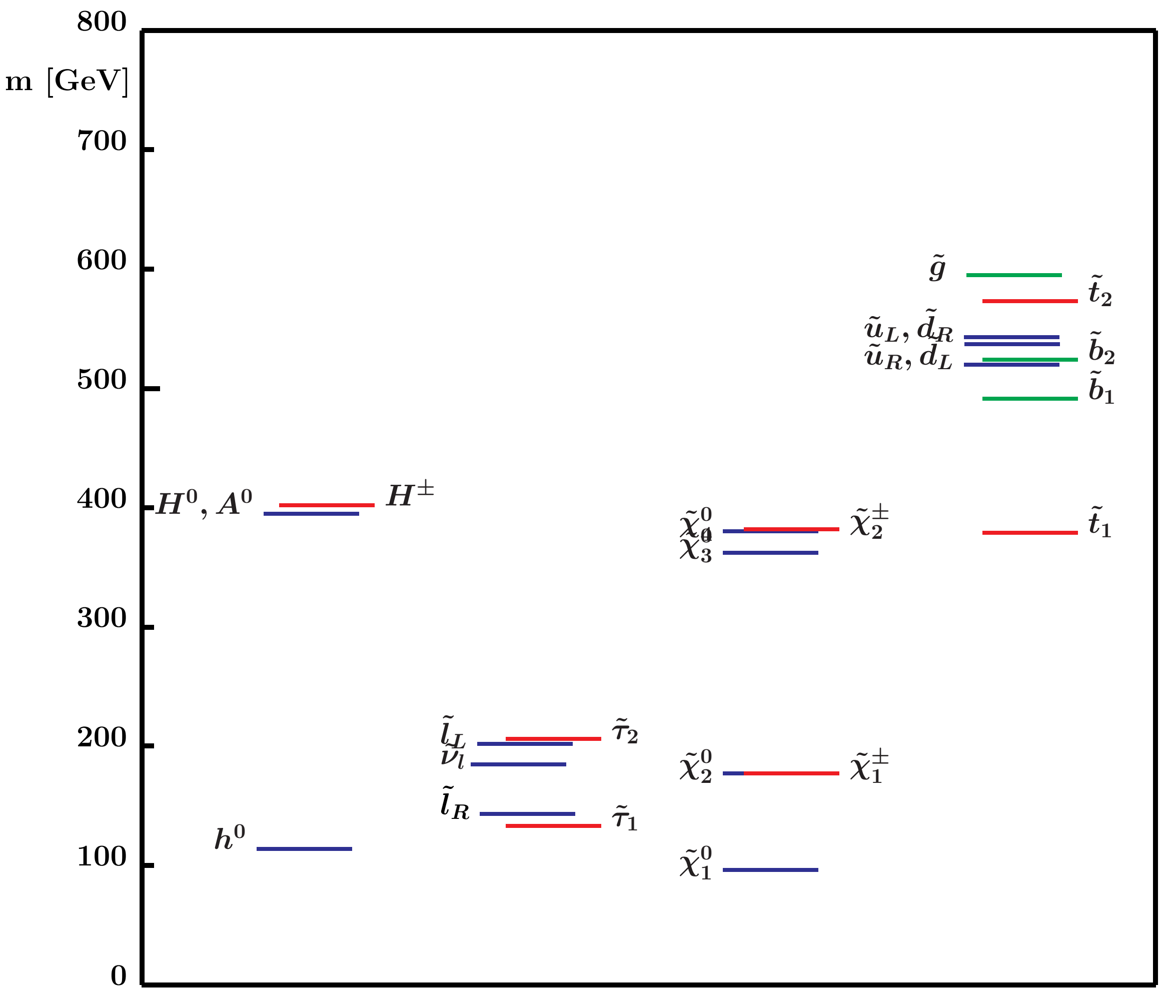

Figure 1: SPS 1 mass spectrum of ISAJET

Isajet parameters

```
Minimal supergravity (mSUGRA) model:

M_0,  M_(1/2),  A_0,  tan(beta),  sgn(mu),  M_t =
  100.000   250.000  -100.000    10.000     1.0   175.000

ISASUGRA unification:
M_GUT      = 0.218E+17   g_GUT          =0.714      alpha_GUT =0.041
FT_GUT     = 0.481       FB_GUT         = 0.046     FL_GUT = 0.069

1/alpha_em =  127.70     sin**2(thetaw) =0.2309     alpha_s   =0.119
M_1        =   99.13     M_2            =  192.74   M_3       =  580.51
mu(Q)      =  352.39     B(Q)           =   44.54   Q         =  454.65
M_H1^2     = 0.333E+05   M_H2^2         =-0.124E+06

ISAJET masses (with signs):
M(GL)  =   595.19
M(UL)  =   537.25   M(UR)  =   520.45   M(DL)  =   543.04   M(DR) =   520.14
M(B1)  =   491.91   M(B2)  =   524.59   M(T1)  =   379.11   M(T2) =   574.71
M(SN)  =   186.00   M(EL)  =   202.14   M(ER)  =   142.97
M(NTAU)=   185.06   M(TAU1)=   133.22   M(TAU2)=   206.13
M(Z1)  =   -96.05   M(Z2)  =  -176.82   M(Z3)  =   358.81   M(Z4) =  -377.81
M(W1)  =  -176.38   M(W2)  =  -378.23
M(HL)  =   113.97   M(HH)  =   394.15   M(HA)  =   393.63   M(H+) =   401.77

theta_t=   0.9603   theta_b=   0.4916   theta_l=   1.2876   alpha_h=   0.1107

NEUTRALINO MASSES (SIGNED) =   -96.051  -176.820   358.815  -377.811
EIGENVECTOR 1       =   0.05441  -0.15001  -0.05711   0.98553
EIGENVECTOR 2       =   0.16023  -0.27963  -0.94070  -0.10592
EIGENVECTOR 3       =  -0.71046  -0.69495   0.09245  -0.06120
EIGENVECTOR 4       =   0.68309  -0.64525   0.32137  -0.11730

CHARGINO MASSES (SIGNED)  =  -176.383  -378.229
GAMMAL, GAMMAR             =   1.99234   1.80868


ISAJET equivalent input:
MSSMA:   595.19  352.39  393.63   10.00
MSSMB:   539.86  519.53  521.66  196.64  136.23
MSSMC:   495.91  516.86  424.83  195.75  133.55 -510.01 -772.66 -254.20
MSSMD: SAME AS MSSMB (DEFAULT)
MSSME:    99.13  192.74
```

1.2 Spectrum & parameters of SUSYGEN 3.00/27

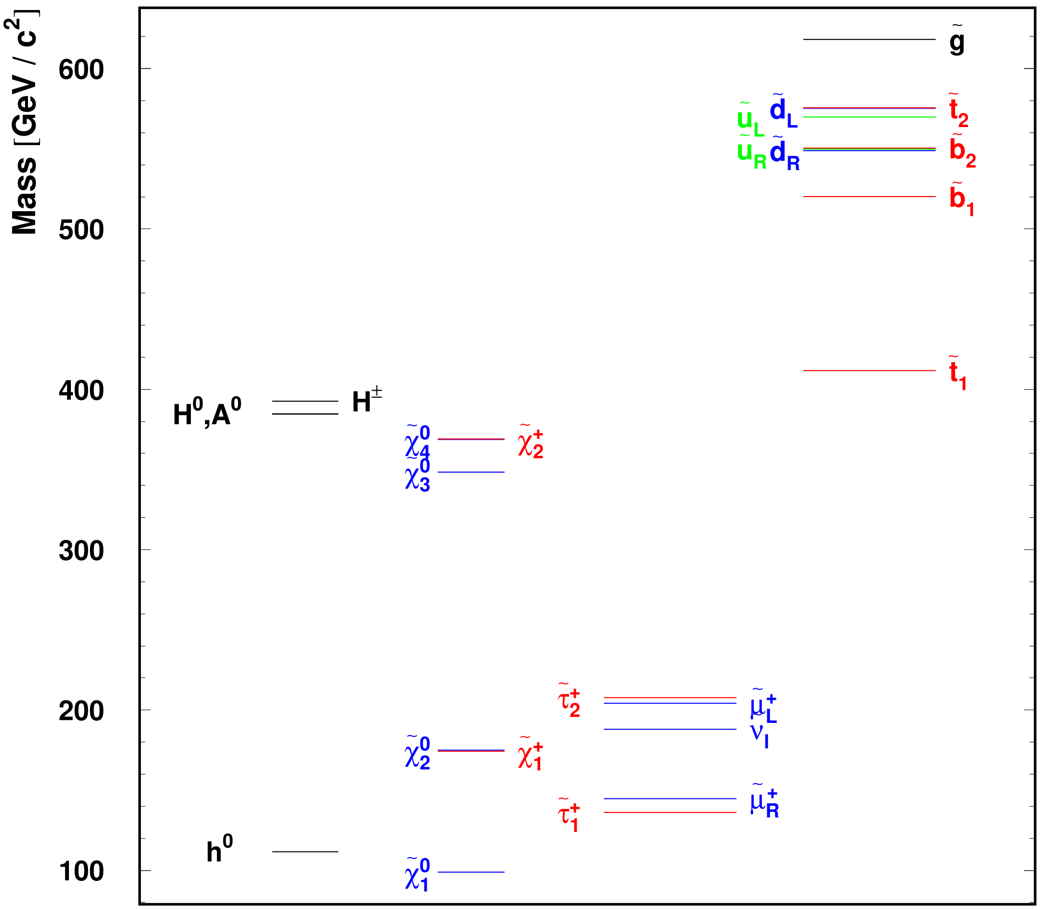

Figure 2: SPS 1 mass spectrum of SUSYGEN

Susygen parameters

```
Susygen Inputs:
--------------

m0      =   100.000   TANB     =    10.000
m1/2    =   250.000    mu/|mu| =     1
A0      =  -100.000

Sparticle masses:
----------------
SUPR      550.  SUPL       570.
SDNR      549.  SDNL       575.
SELR      145.  SELL       204.
SNU       188.
STP1      412.  STP2       576. cosmix =  0.534
SBT1      520.  SBT2       550. cosmix =  0.913
STA1      136.  STA2       208. cosmix=   0.271
SGLU      618.


Gaugino masses:
--------------

M1 =    102.191 M2 =    191.812 M3 =    588.293

NEUTRALINO m, CP, ph/zi/ha/hb 1 =   98.8  1.  0.831 -0.530  0.075  0.152
NEUTRALINO m, CP, ph/zi/ha/hb 2 =  174.9  1. -0.554 -0.762  0.196  0.271
NEUTRALINO m, CP, ph/zi/ha/hb 3 =  348.4 -1. -0.009  0.113 -0.638  0.762
NEUTRALINO m, CP, ph/zi/ha/hb 4 =  368.7  1. -0.054 -0.354 -0.741 -0.569

CHARGINO MASSES    =   174.211   369.022
CHARGINO ETA       =    -1.000     1.000

U matrix      WINO      HIGGSINO   V matrix      WINO     HIGGSINO
W1SS+        -0.905     0.426      W1SS-         0.968    -0.249
W2SS+         0.426     0.905      W2SS-         0.249     0.968


Higgses masses:
--------------

Light CP-even Higgs =   111.794
Heavy CP-even Higgs =   384.532
      CP-odd  Higgs =   384.598
      Charged Higgs =   392.561
      sin(a-b)      =    -0.111
      cos(a-b)      =     0.994
```

1.3 Spectrum & parameters of PYTHIA 6.2/00

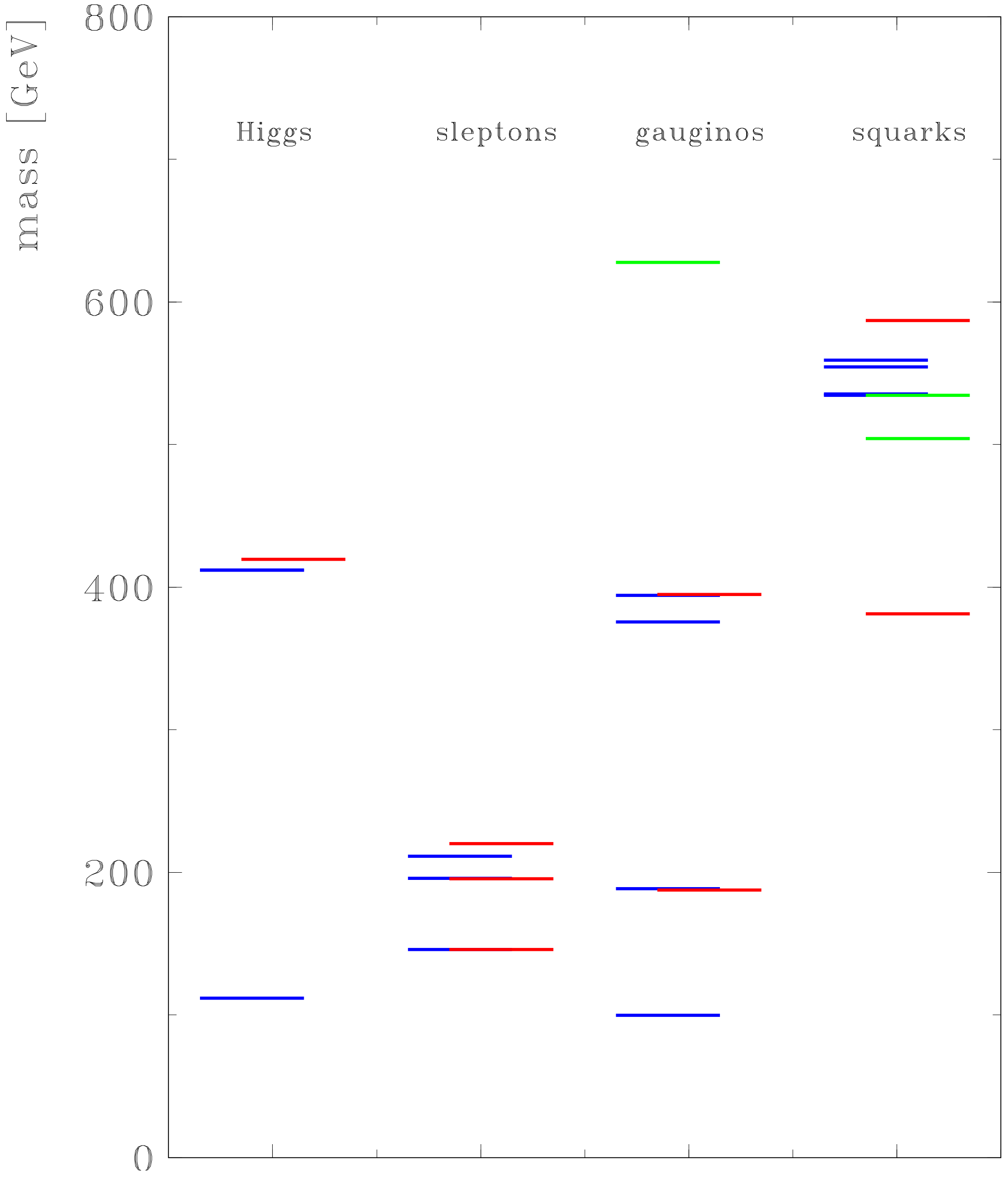

Figure 3: SPS 1 mass spectrum of Pythia

Pythia parameters

```
SUGRA input parameters
----------------------
m_0         RMSS( 8) =   100.0
m_1/2       RMSS( 1) =   250.0
A_0         RMSS(16) =  -100.0
tan_beta    RMSS( 5) =   10.00
sign mu     RMSS( 4) =   1.000

sparticle masses & widths
-------------------------
M_se_R   145.8 ( 0.204)   M_se_L   211.4 ( 0.235)   M_sne_L  195.8 ( 0.173)
M_sm_R   145.8 ( 0.204)   M_sm_L   211.4 ( 0.235)   M_snm_L  195.8 ( 0.173)
M_st_1   146.0 ( 0.198)   M_st_2   220.2 ( 0.335)   M_snt_L  195.6 ( 0.171)

M_ch0_1   99.9 ( 0.000)   M_ch0_2  188.4 ( 0.015)   M_ch0_3  375.7 ( 2.209)
M_ch0_4  394.2 ( 2.946)
M_ch+_1  187.7 ( 0.012)   M_ch+_2  394.8 ( 2.888)

M_h0     111.7 ( 0.004)   M_H0     412.1 ( 0.910)   M_A0     411.9 ( 0.980)
M_H+     419.5 ( 0.855)

M_g~     627.8 (11.779)
M_uL     554.4 ( 5.376)   M_uR     535.3 ( 1.127)   M_dL     559.3 ( 5.159)
M_dR     534.4 ( 0.281)
M_b1     504.2 ( 3.590)   M_b2     534.6 ( 1.060)   M_t1     381.3 ( 1.768)
M_t2     587.1 ( 7.620)

parameter settings IMSS, RMSS
-----------------------------
IMSS( 1) = 2   IMSS( 4) = 1   IMSS( 7) = 0   IMSS(10) = 0
IMSS( 2) = 0   IMSS( 5) = 0   IMSS( 8) = 0   IMSS(11) = 0
IMSS( 3) = 0   IMSS( 6) = 0   IMSS( 9) = 0   IMSS(12) = 0

RMSS( 1) =   250.0       RMSS( 9) =   700.0       RMSS(17) =   100.0
RMSS( 2) =   204.0       RMSS(10) =   504.9       RMSS(18) = -0.1098
RMSS( 3) =   600.2       RMSS(11) =   530.1       RMSS(19) =   412.1
RMSS( 4) =   369.6       RMSS(12) =   430.3       RMSS(20) =  0.4100E-01
RMSS( 5) =   10.00       RMSS(13) =   211.2       RMSS(21) =   1.000
RMSS( 6) =   211.4       RMSS(14) =   145.3       RMSS(22) =   800.0
RMSS( 7) =   145.8       RMSS(15) =   100.0       RMSS(23) =  0.1000E+05
RMSS( 8) =   100.0       RMSS(16) =  -532.9       RMSS(24) =  0.1000E+05
```

1.4 Decay modes

particle	m_I	m_S	m_P	decay	$\mathcal{B}_I$	$\mathcal{B}_S$	$\mathcal{B}_P$
$\tilde{e}_R^-$	143.0	144.9	145.8	$\tilde{\chi}_1^0 e^-$	1.000	1.000	1.000
$\tilde{e}_L^-$	202.1	204.1	211.4	$\tilde{\chi}_1^0 e^-$	0.490	0.408	0.556
				$\tilde{\chi}_2^0 e^-$	0.187	0.218	0.159
				$\tilde{\chi}_1^- \nu_e$	0.323	0.374	0.285
$\tilde{\nu}_e$	186.0	188.2	195.8	$\tilde{\chi}_1^0 \nu_e$	0.885	0.786	0.920
				$\tilde{\chi}_2^0 \nu_e$	0.031	0.057	
				$\tilde{\chi}_1^+ e^-$	0.083	0.157	0.059
$\tilde{\mu}_R^-$	143.0	144.9	145.8	$\tilde{\chi}_1^0 \mu^-$	1.000	1.000	1.000
$\tilde{\mu}_L^-$	202.1	204.1	211.4	$\tilde{\chi}_1^0 \mu^-$	0.490	0.408	0.556
				$\tilde{\chi}_2^0 \mu^-$	0.187	0.218	0.159
				$\tilde{\chi}_1^- \nu_\mu$	0.323	0.374	0.285
$\tilde{\nu}_\mu$	186.0	188.2	195.8	$\tilde{\chi}_1^0 \nu_\mu$	0.885	0.786	0.920
				$\tilde{\chi}_2^0 \nu_\mu$	0.031	0.057	
				$\tilde{\chi}_1^+ \mu^-$	0.083	0.157	0.059
$\tilde{\tau}_1^-$	133.2	136.0	146.0	$\tilde{\chi}_1^0 \tau^-$	1.000	1.000	1.000
$\tilde{\tau}_2^-$	206.1	207.7	220.2	$\tilde{\chi}_1^0 \tau^-$	0.526	0.453	0.504
				$\tilde{\chi}_2^0 \tau^-$	0.174	0.203	0.179
				$\tilde{\chi}_1^- \nu_\tau$	0.300	0.344	0.316
$\tilde{\nu}_\tau$	185.1	187.2	195.6	$\tilde{\chi}_1^0 \nu_\tau$	0.906	0.806	0.926
				$\tilde{\chi}_2^0 \nu_\tau$		0.052	
				$\tilde{\chi}_1^+ \tau^-$	0.067	0.142	0.054

Table 1: Slepton masses (GeV) and significant branching ratios ($> 3\%$) from Isajet (I), Susygen (S) and Pythia (P)

particle	m_I	m_S	m_P	decay	$\mathcal{B}_I$	$\mathcal{B}_S$	$\mathcal{B}_P$
$\tilde{\chi}_1^0$	96.1	98.8	99.9		1.000	1.000	1.000
$\tilde{\chi}_2^0$	176.8	174.9	188.4	$\tilde{e}_R^- e^+$	0.031	0.037	0.044
				$\tilde{e}_R^+ e^-$	0.031	0.037	0.044
				$\tilde{\mu}_R^- \mu^+$	0.031	0.037	0.044
				$\tilde{\mu}_R^+ \mu^-$	0.031	0.037	0.044
				$\tilde{\tau}_1^- \tau^+$	0.437	0.424	0.407
				$\tilde{\tau}_1^+ \tau^-$	0.437	0.424	0.407
$\tilde{\chi}_3^0$	358.8	348.4	375.7	$\tilde{\chi}_1^+ W^-$	0.298	0.349	0.299
				$\tilde{\chi}_1^- W^+$	0.298	0.349	0.299
				$\tilde{\chi}_1^0 Z^0$	0.108	0.087	0.106
				$\tilde{\chi}_2^0 Z^0$	0.215	0.155	0.218
$\tilde{\chi}_4^0$	377.8	368.7	394.2	$\tilde{\chi}_1^+ W^-$	0.263	0.302	0.263
				$\tilde{\chi}_1^- W^+$	0.263	0.302	0.263
				$\tilde{\chi}_1^0 h^0$	0.064	0.054	0.062
				$\tilde{\chi}_2^0 h^0$	0.134	0.103	0.144

Table 2: Neutralino masses (GeV) and significant branching ratios (> 3%) from Isajet (I), Susygen (S) and Pythia (P)

particle	m_I	m_S	m_P	decay	$\mathcal{B}_I$	$\mathcal{B}_S$	$\mathcal{B}_P$
$\tilde{\chi}_1^+$	176.4	174.2	187.7	$\tilde{\tau}_1^+ \nu_\tau$	0.979	0.864	0.847
				$\tilde{\chi}_1^0 W^+$			0.153
$\tilde{\chi}_2^+$	378.2	369.0	394.8	$\tilde{\chi}_1^0 W^+$	0.064	0.062	0.065
				$\tilde{\chi}_2^0 W^+$	0.296	0.303	0.065
				$\tilde{e}_L^+ \nu_e$	0.052	0.056	0.049
				$\tilde{\mu}_L^+ \nu_\mu$	0.052	0.056	0.049
				$\tilde{\tau}_2^+ \nu_\tau$	0.056	0.055	0.051
				$\tilde{\chi}_1^+ Z^0$	0.244	0.393	0.243
				$\tilde{\chi}_1^+ h^0$	0.170		0.173

Table 3: Chargino masses (GeV) and significant branching ratios (> 3%) from Isajet (I), Susygen (S) and Pythia (P)

particle	m_I	m_S	m_P	decay	$\mathcal{B}_I$	$\mathcal{B}_S$	$\mathcal{B}_P$
h^0	114.0	111.8	111.7	$\tau^-\tau^+$	0.051	0.080	0.068
				$b\bar{b}$	0.847	0.792	0.809
				$c\bar{c}$	0.035		0.043
				gg		0.060	
				W^+W^-		0.040	
H^0	394.1	384.5	412.1	$\tau^-\tau^+$	0.059	0.091	0.094
				$b\bar{b}$	0.807	0.703	0.848
				$t\bar{t}$	0.031	0.038	0.043
				$\tilde{\chi}_1^0\tilde{\chi}_2^0$	0.034		
				$\tilde{\chi}_1^+\tilde{\chi}_1^-$		0.042	
A^0	393.6	384.6	411.9	$\tau^-\tau^+$	0.049	0.060	0.087
				$b\bar{b}$	0.681	0.465	0.791
				$t\bar{t}$	0.092	0.099	0.119
				$\tilde{\chi}_1^0\tilde{\chi}_2^0$	0.065	0.082	
				$\tilde{\chi}_2^0\tilde{\chi}_2^0$	0.058	0.075	
				$\tilde{\chi}_1^-\tilde{\chi}_1^+$		0.194	
H^+	401.8	392.6	419.5	$\nu_\tau\tau^+$	0.077	0.093	0.102
				$t\bar{b}$	0.770	0.727	0.895
				$\tilde{\chi}_1^+\tilde{\chi}_1^0$	0.130	0.165	

Table 4: Higgs masses (GeV) and significant branching ratios (> 3%) from ISAJET (I), SUSYGEN (S) and PYTHIA (P)

particle	m_I	m_S	m_P	decay	$\mathcal{B}_I$	$\mathcal{B}_S$	$\mathcal{B}_P$
$\tilde{t}_1$	379.1	411.6	381.3	$\tilde{\chi}_1^0 t$	0.179	0.146	0.189
				$\tilde{\chi}_2^0 t$	0.095	0.115	0.078
				$\tilde{\chi}_1^+ b$	0.726	0.664	0.732
				$\tilde{\chi}_2^+ b$		0.075	
$\tilde{t}_2$	574.7	575.7	587.1	$\tilde{\chi}_1^+ b$	0.206	0.241	0.193
				$\tilde{\chi}_2^+ b$	0.216	0.361	0.198
				$Z^0 \tilde{t}_1$	0.225		0.270
				$h^0 \tilde{t}_1$	0.042		0.034
				$\tilde{\chi}_1^0 t$	0.030		0.032
				$\tilde{\chi}_2^0 t$	0.080	0.056	0.078
				$\tilde{\chi}_3^0 t$	0.033	0.163	0.036
				$\tilde{\chi}_4^0 t$	0.166	0.164	0.158
$\tilde{b}_1$	491.9	520.0	504.2	$\tilde{\chi}_1^0 b$	0.062	0.061	0.035
				$\tilde{\chi}_2^0 b$	0.362	0.357	0.330
				$\tilde{\chi}_1^- t$	0.428	0.542	0.401
				$W^- \tilde{t}_1$	0.133		0.224
$\tilde{b}_2$	524.6	550.4	534.6	$\tilde{\chi}_1^0 b$	0.148	0.196	0.242
				$\tilde{\chi}_2^0 b$	0.171	0.118	0.192
				$\tilde{\chi}_3^0 b$	0.053	0.181	
				$\tilde{\chi}_4^0 b$	0.072	0.205	
				$\tilde{\chi}_1^- t$	0.213	0.153	0.255
				$\tilde{\chi}_2^- t$		0.147	
				$W^- \tilde{t}_1$	0.344		0.304

Table 5: Light squark masses (GeV) and significant branching ratios ($> 3\%$) from Isajet (I), Susygen (S) and Pythia (P)

2 SPS 2 – mSUGRA scenario

m_0	1450 GeV
$m_{1/2}$	300 GeV
A_0	0 GeV
$\tan\beta$	10
sign μ	$+$

'focus point' scenario
$m_0 = 2\,m_{1/2} + 800$ GeV

2.1 Spectrum & parameters of ISAJET 7.58

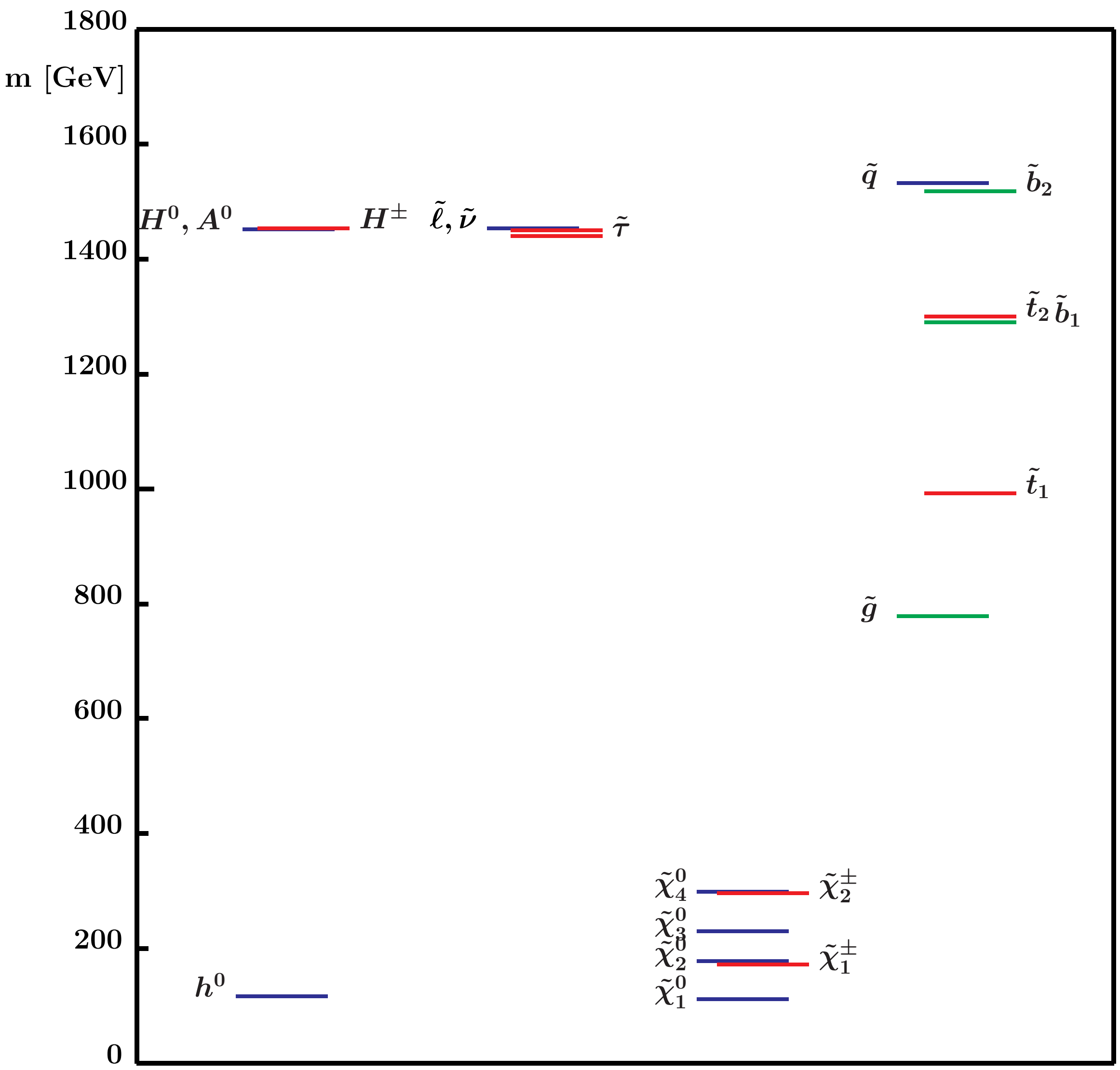

Figure 1: SPS 2 mass spectrum of ISAJET

Isajet parameters

```
Minimal supergravity (mSUGRA) model:

M_0,  M_(1/2),  A_0,  tan(beta),  sgn(mu),  M_t =
 1450.000   300.000     0.000    10.000     1.0   175.000

ISASUGRA unification:
M_GUT      = 0.270E+17   g_GUT          =0.701      alpha_GUT =0.039
FT_GUT     = 0.460       FB_GUT         = 0.048     FL_GUT = 0.068

1/alpha_em =  127.71     sin**2(thetaw) =0.2310     alpha_s   =0.119
M_1        =  120.36     M_2            =  234.12   M_3       =  696.46
mu(Q)      =  124.77     B(Q)           = 1653.71   Q         = 1077.13
M_H1^2     = 0.205E+07   M_H2^2         = 0.319E+05

ISAJET masses (with signs):
M(GL)  =   784.37
M(UL)  =  1532.70   M(UR)  =  1530.08   M(DL)  =  1534.74   M(DR) =  1530.49
M(B1)  =  1296.56   M(B2)  =  1520.09   M(T1)  =  1003.88   M(T2) =  1307.41
M(SN)  =  1454.17   M(EL)  =  1456.33   M(ER)  =  1451.69
M(NTAU)=  1448.15   M(TAU1)=  1439.46   M(TAU2)=  1450.38
M(Z1)  =   -79.54   M(Z2)  =   135.34   M(Z3)  =  -140.84   M(Z4) =  -269.45
M(W1)  =  -104.03   M(W2)  =  -269.03
M(HL)  =   115.71   M(HH)  =  1444.10   M(HA)  =  1442.95   M(H+) =  1446.18

theta_t=   1.4446   theta_b=   0.0094   theta_l=   1.4909   alpha_h=   0.1007

NEUTRALINO MASSES (SIGNED) =   -79.537   135.343  -140.839  -269.450
EIGENVECTOR 1       =   0.45040  -0.64968  -0.26524   0.55200
EIGENVECTOR 2       =   0.72890   0.65991  -0.14274   0.11336
EIGENVECTOR 3       =   0.35117  -0.31805  -0.32663  -0.81782
EIGENVECTOR 4       =  -0.37752   0.20316  -0.89587   0.11668

CHARGINO MASSES (SIGNED)  =  -104.031  -269.026
GAMMAL, GAMMAR             =   2.85552   2.58052


ISAJET equivalent input:
MSSMA:   784.37  124.77 1442.95   10.00
MSSMB:  1533.62 1530.29 1530.49 1455.57 1451.04
MSSMC:  1295.25 1519.86  998.47 1449.56 1438.88 -563.70 -797.21 -187.83
MSSMD: SAME AS MSSMB (DEFAULT)
MSSME:   120.36  234.12
```

2.2 Spectrum & parameters of SUSYGEN 3.00/27

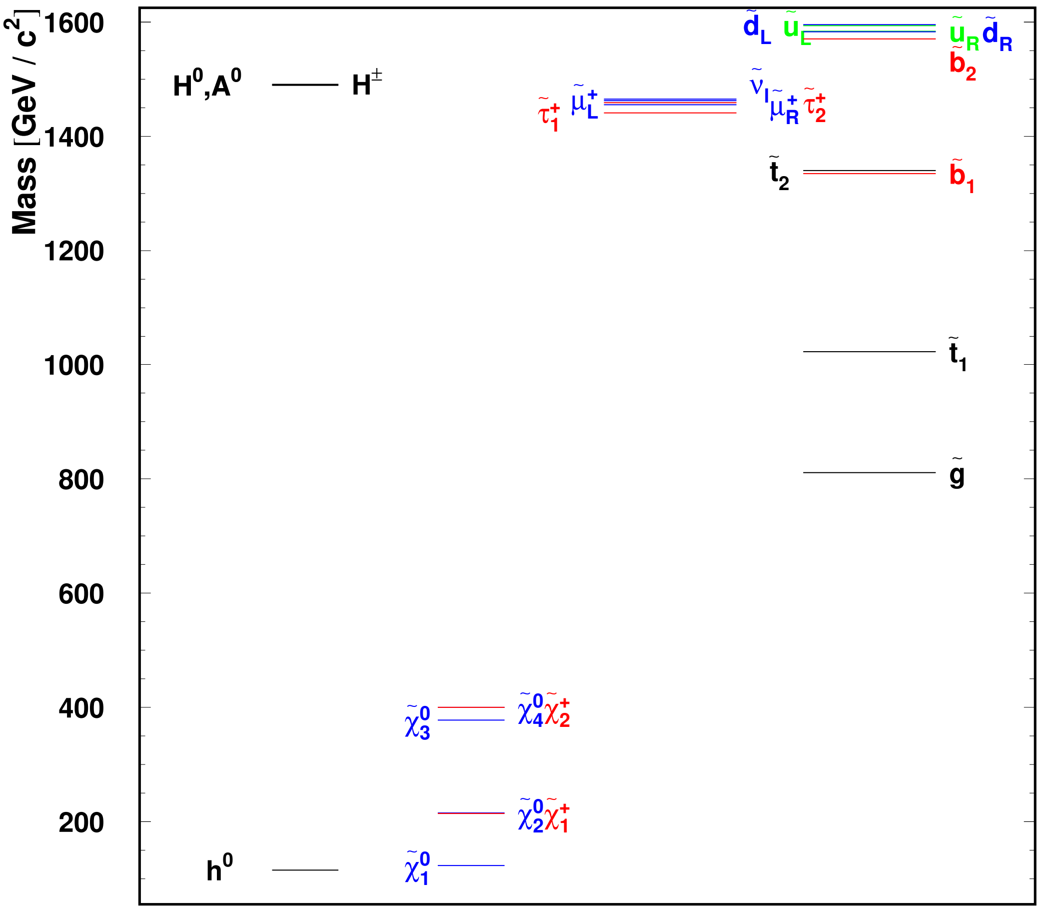

Figure 2: SPS 2 mass spectrum of SUSYGEN

SUSYGEN **parameters**

```
Susygen inputs:
--------------

m0      =  1450.000   TANB     =    10.000
m1/2    =   300.000    mu/|mu| =     1
A0      =     0.000

Sparticle masses:
----------------

SUPR     1584.  SUPL      1593.
SDNR     1583.  SDNL      1595.
SELR     1455.  SELL      1465.
SNU      1463.
STP1     1022.  STP2      1340. cosmix =  0.103
SBT1     1335.  SBT2      1571. cosmix =  1.000
STA1     1441.  STA2      1459. cosmix=   0.140
SGLU      811.

Gaugino masses:
--------------

NEUTRALINO m, CP, ph/zi/ha/hb 1 =  123.1  1.  0.837 -0.523  0.077  0.142
NEUTRALINO m, CP, ph/zi/ha/hb 2 =  214.6  1. -0.543 -0.763  0.218  0.276
NEUTRALINO m, CP, ph/zi/ha/hb 3 =  377.6 -1. -0.009  0.100 -0.637  0.764
NEUTRALINO m, CP, ph/zi/ha/hb 4 =  399.9  1. -0.067 -0.368 -0.735 -0.566

CHARGINO MASSES    =   213.915   399.841
CHARGINO ETA      =    -1.000     1.000

U matrix      WINO      HIGGSINO    V matrix      WINO      HIGGSINO
W1SS+        -0.901     0.434       W1SS-         0.960    -0.279
W2SS+         0.434     0.901       W2SS-         0.279     0.960

Higgses masses:
--------------

Light CP-even Higgs =   114.873
Heavy CP-even Higgs =  1490.196
      CP-odd  Higgs =  1489.165
      Charged Higgs =  1491.171
      sin(a-b)      =    -0.100
      cos(a-b)      =     0.995
```

2.3 Spectrum & parameters of PYTHIA 6.2/00

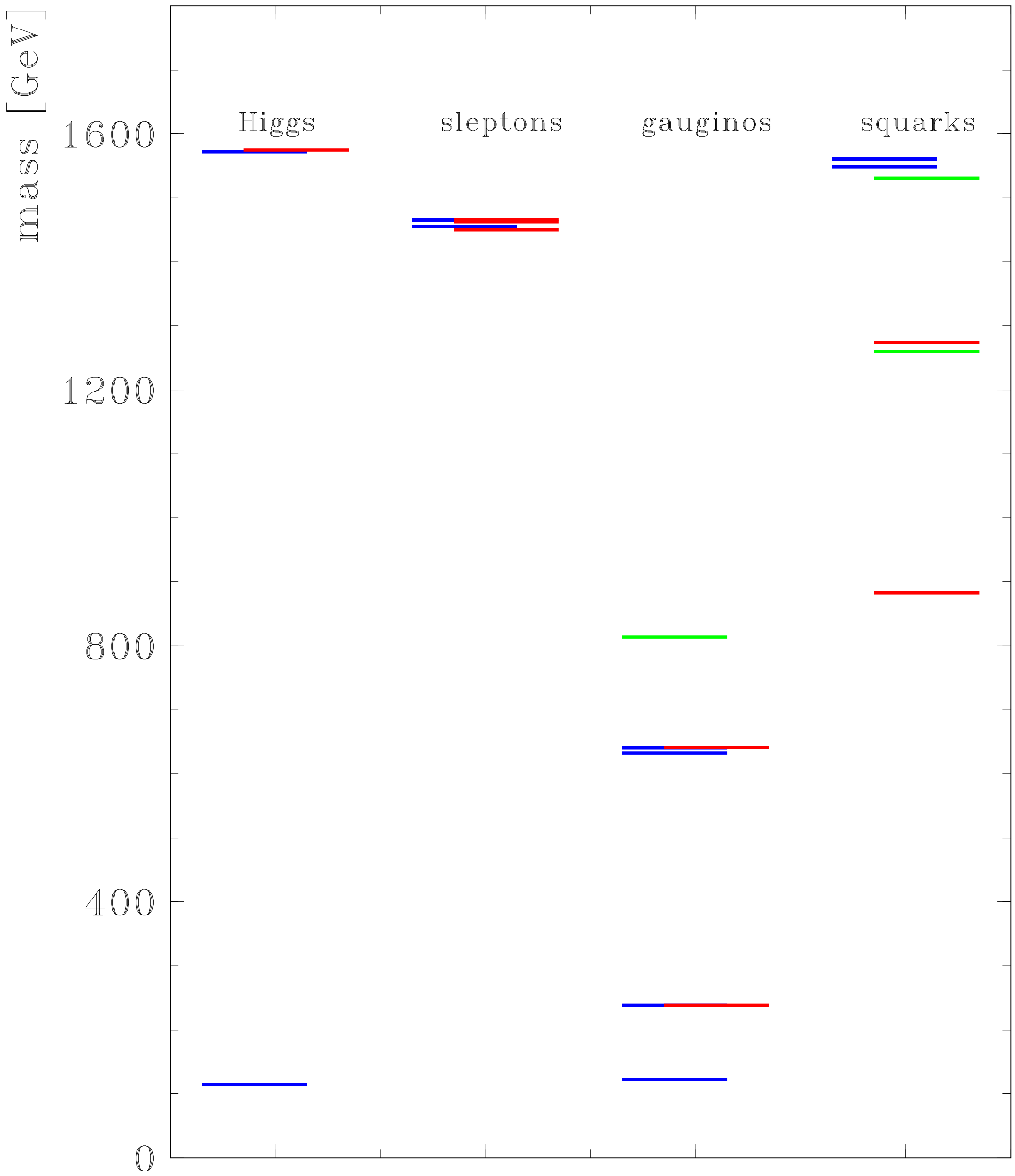

Figure 3: SPS 2 mass spectrum of Pythia

Pythia parameters

```
SUGRA input parameters
----------------------
m_0         RMSS( 8) =   1450.
m_1/2       RMSS( 1) =   300.0
A_0         RMSS(16) =   0.000
tan_beta    RMSS( 5) =   10.00
sign mu     RMSS( 4) =   1.000

sparticle masses & widths
-------------------------
M_se_R  1455.3 ( 7.470)   M_se_L  1466.8 (19.692)   M_sne_L 1464.6 (19.753)
M_sm_R  1455.3 ( 7.471)   M_sm_L  1466.8 (19.693)   M_snm_L 1464.6 (19.754)
M_st_1  1450.0 ( 8.659)   M_st_2  1466.1 (19.071)   M_snt_L 1462.2 (19.923)

M_ch0_1  122.0 ( 0.000)   M_ch0_2  238.1 ( 0.001)   M_ch0_3  632.3 ( 4.785)
M_ch0_4  640.3 ( 4.759)
M_ch+_1  238.0 ( 0.002)   M_ch+_2  641.2 ( 4.815)

M_h0     114.1 ( 0.004)   M_H0    1572.3 ( 3.711)   M_A0    1571.6 ( 3.733)
M_H+    1574.6 ( 3.802)

M_g~     814.1 ( 0.004)
M_uL    1559.7 (68.025)   M_uR    1549.1 (51.354)   M_dL    1561.7 (68.063)
M_dR    1548.3 (48.633)
M_b1    1259.8 (55.517)   M_b2    1530.2 (47.344)   M_t1     882.7 ( 8.311)
M_t2    1274.0 (52.448)

parameter settings IMSS, RMSS
-----------------------------
IMSS( 1) = 2   IMSS( 4) = 1   IMSS( 7) = 0   IMSS(10) = 0
IMSS( 2) = 0   IMSS( 5) = 0   IMSS( 8) = 0   IMSS(11) = 0
IMSS( 3) = 0   IMSS( 6) = 0   IMSS( 9) = 0   IMSS(12) = 0

RMSS( 1) =   300.0       RMSS( 9) =   700.0       RMSS(17) =   0.000
RMSS( 2) =   244.9       RMSS(10) =   1259.       RMSS(18) = -0.1004
RMSS( 3) =   706.3       RMSS(11) =   1530.       RMSS(19) =   1573.
RMSS( 4) =   628.3       RMSS(12) =   876.4       RMSS(20) =  0.4100E-01
RMSS( 5) =   10.00       RMSS(13) =   1464.       RMSS(21) =   1.000
RMSS( 6) =   1467.       RMSS(14) =   1450.       RMSS(22) =   800.0
RMSS( 7) =   1455.       RMSS(15) =   0.000       RMSS(23) =  0.1000E+05
RMSS( 8) =   1450.       RMSS(16) =  -610.2       RMSS(24) =  0.1000E+05
```

2.4 Decay modes

particle	m_I	m_S	m_P	decay	$\mathcal{B}_I$	$\mathcal{B}_S$	$\mathcal{B}_P$
$\tilde{e}_R^-$	1451.7	1455.1	1455.3	$\tilde{\chi}_1^0 e^-$	0.308	0.973	0.995
				$\tilde{\chi}_3^0 e^-$	0.667		
$\tilde{e}_L^-$	1456.3	1464.9	1466.8	$\tilde{\chi}_1^0 e^-$		0.074	
				$\tilde{\chi}_2^0 e^-$		0.300	0.307
				$\tilde{\chi}_3^0 e^-$	0.190		
				$\tilde{\chi}_4^0 e^-$	0.207		
				$\tilde{\chi}_1^- \nu_e$	0.051	0.498	0.582
				$\tilde{\chi}_2^- \nu_e$	0.551	0.104	
$\tilde{\nu}_e$	1454.2	1462.7	1464.6	$\tilde{\chi}_1^0 \nu_e$	0.103	0.112	0.101
				$\tilde{\chi}_2^0 \nu_e$		0.231	0.285
				$\tilde{\chi}_4^0 \nu_e$	0.274	0.048	
				$\tilde{\chi}_1^+ e^-$	0.179	0.563	0.601
				$\tilde{\chi}_2^+ e^-$	0.426	0.043	
$\tilde{\mu}_R^-$	1451.7	1455.1	1455.3	$\tilde{\chi}_1^0 \mu^-$	0.308	0.973	0.995
				$\tilde{\chi}_3^0 \mu^-$	0.667		
$\tilde{\mu}_L^-$	1456.3	1464.9	1466.8	$\tilde{\chi}_1^0 \mu^-$		0.074	
				$\tilde{\chi}_2^0 \mu^-$		0.300	0.307
				$\tilde{\chi}_3^0 \mu^-$	0.190		
				$\tilde{\chi}_4^0 \mu^-$	0.207		
				$\tilde{\chi}_1^- \nu_\mu$	0.051	0.498	0.582
				$\tilde{\chi}_2^- \nu_\mu$	0.551	0.104	
$\tilde{\nu}_\mu$	1454.2	1462.7	1464.6	$\tilde{\chi}_1^0 \nu_\mu$	0.103	0.112	0.101
				$\tilde{\chi}_2^0 \nu_\mu$		0.231	0.285
				$\tilde{\chi}_4^0 \nu_\mu$	0.274	0.049	
				$\tilde{\chi}_1^+ \mu^-$	0.179	0.563	0.601
				$\tilde{\chi}_2^+ \mu^-$	0.426	0.043	
$\tilde{\tau}_1^-$	1439.5	1441.3	1450.0	$\tilde{\chi}_1^0 \tau^-$	0.306	0.869	0.819
				$\tilde{\chi}_2^0 \tau^-$		0.039	0.054
				$\tilde{\chi}_3^0 \tau^-$	0.613		
				$\tilde{\chi}_1^- \nu_\tau$	0.045	0.055	0.102
$\tilde{\tau}_2^-$	1450.4	1458.5	1466.1	$\tilde{\chi}_1^0 \tau^-$		0.079	0.108
				$\tilde{\chi}_2^0 \tau^-$		0.291	0.293
				$\tilde{\chi}_3^0 \tau^-$	0.190		
				$\tilde{\chi}_4^0 \tau^-$	0.206	0.033	
				$\tilde{\chi}_1^- \nu_\tau$	0.046	0.478	0.554
				$\tilde{\chi}_2^- \nu_\tau$	0.545	0.111	
$\tilde{\nu}_\tau$	1448.2	1456.0	1464.4	$\tilde{\chi}_1^0 \nu_\tau$	0.101	0.112	0.100
				$\tilde{\chi}_2^0 \nu_\tau$		0.231	0.282
				$\tilde{\chi}_4^0 \nu_\tau$	0.270	0.048	
				$\tilde{\chi}_1^+ \tau^-$	0.190	0.563	0.595
				$\tilde{\chi}_2^+ \tau^-$	0.421	0.042	

Table 1: Slepton masses (GeV) and significant branching ratios ($> 3\%$) from Isajet (I), Susygen (S) and Pythia (P)

particle	m_I	m_S	m_P	decay	$\mathcal{B}_I$	$\mathcal{B}_S$	$\mathcal{B}_P$
$\tilde{\chi}_1^0$	79.5	123.1	122.0		1.000	1.000	1.000
$\tilde{\chi}_2^0$	135.3	214.6	238.1	$\tilde{\chi}_1^- ud$	0.033		
				$\tilde{\chi}_1^+ d\bar{u}$	0.033		
				$\tilde{\chi}_1^- c\bar{s}$	0.033		
				$\tilde{\chi}_1^+ s\bar{c}$	0.033		
				$\tilde{\chi}_1^0 u\bar{u}$	0.096		
				$\tilde{\chi}_1^0 d\bar{d}$	0.124		
				$\tilde{\chi}_1^0 s\bar{s}$	0.124		
				$\tilde{\chi}_1^0 c\bar{c}$	0.096		
				$\tilde{\chi}_1^0 b\bar{b}$	0.114		
				$\tilde{\chi}_1^0 \nu_e\bar{\nu}_e$	0.056		
				$\tilde{\chi}_1^0 \nu_\mu\bar{\nu}_\mu$	0.056		
				$\tilde{\chi}_1^0 \nu_\tau\bar{\nu}_\tau$	0.056		
				$\tilde{\chi}_1^0 Z^0$		1.000	0.223
				$\tilde{\chi}_1^0 h^0$			0.777
$\tilde{\chi}_3^0$	140.8	377.6	632.3	$\tilde{\chi}_1^- ud$	0.155		
				$\tilde{\chi}_1^- \nu_e e^+$	0.052		
				$\tilde{\chi}_1^- \nu_\mu \mu^+$	0.052		
				$\tilde{\chi}_1^+ d\bar{u}$	0.155		
				$\tilde{\chi}_1^+ e^- \bar{\nu}_e$	0.052		
				$\tilde{\chi}_1^+ \mu^- \bar{\nu}_\mu$	0.052		
				$\tilde{\chi}_1^- c\bar{s}$	0.155		
				$\tilde{\chi}_1^- \nu_\tau \tau^+$	0.052		
				$\tilde{\chi}_1^+ s\bar{c}$	0.155		
				$\tilde{\chi}_1^+ \tau^- \bar{\nu}_\tau$	0.052		
				$\tilde{\chi}_1^0 Z^0$		0.094	0.075
				$\tilde{\chi}_2^0 Z^0$		0.151	0.253
				$\tilde{\chi}_2^0 h^0$			0.033
				$\tilde{\chi}_1^+ W^-$		0.369	0.309
				$\tilde{\chi}_1^- W^+$		0.369	0.309
$\tilde{\chi}_4^0$	269.4	399.9	640.3	$\tilde{\chi}_1^+ W^-$	0.371	0.391	0.314
				$\tilde{\chi}_1^- W^+$	0.371	0.391	0.314
				$\tilde{\chi}_2^0 Z^0$	0.152		0.038
				$\tilde{\chi}_1^0 h^0$	0.033	0.069	0.068
				$\tilde{\chi}_2^0 h^0$		0.119	0.242
				$\tilde{\chi}_3^0 h^0$	0.050		

Table 2: Neutralino masses (GeV) and significant branching ratios ($> 3\%$) from Isajet (I), Susygen (S) and Pythia (P)

particle	m_I	m_S	m_P	decay	$\mathcal{B}_I$	$\mathcal{B}_S$	$\mathcal{B}_P$
$\tilde{\chi}_1^+$	104.0	213.9	238.0	$\tilde{\chi}_1^0 u\bar{d}$	0.333		
				$\tilde{\chi}_1^0 c\bar{s}$	0.333		
				$\tilde{\chi}_1^0 e^+\nu_e$	0.111		
				$\tilde{\chi}_1^0 \mu^+\nu_\mu$	0.111		
				$\tilde{\chi}_1^0 \tau^+\nu_\tau$	0.111		
				$\tilde{\chi}_1^0 W^+$		1.000	1.000
$\tilde{\chi}_2^+$	269.0	399.8	641.2	$\tilde{\chi}_1^0 W^+$	0.126	0.084	0.085
				$\tilde{\chi}_2^0 W^+$	0.250	0.378	0.328
				$\tilde{\chi}_3^0 W^+$	0.187		
				$\tilde{\chi}_1^+ Z^0$	0.297	0.537	0.307
				$\tilde{\chi}_1^+ h^0$	0.141		0.280

Table 3: Chargino masses (GeV) and significant branching ratios (> 3%) from Isajet (I), Susygen (S) and Pythia (P)

particle	m_I	m_S	m_P	decay	$\mathcal{B}_I$	$\mathcal{B}_S$	$\mathcal{B}_P$
h^0	115.7	114.9	114.1	$\tau^-\tau^+$	0.049	0.076	0.065
				$b\bar{b}$	0.819	0.747	0.774
				$c\bar{c}$	0.040		0.048
				gg	0.031	0.071	0.040
				W^+W^-		0.070	0.061
H^0	1444.1	1490.2	1572.3	$b\bar{b}$	0.149	0.094	0.724
				$t\bar{t}$	0.032	0.033	0.184
				$\tilde{\chi}^0_1\tilde{\chi}^0_1$	0.060		
				$\tilde{\chi}^0_1\tilde{\chi}^0_4$	0.055		
				$\tilde{\chi}^0_2\tilde{\chi}^0_2$		0.033	
				$\tilde{\chi}^0_2\tilde{\chi}^0_3$		0.114	
				$\tilde{\chi}^0_2\tilde{\chi}^0_4$	0.133		
				$\tilde{\chi}^+_1\tilde{\chi}^-_1$	0.118	0.082	
				$\tilde{\chi}^+_1\tilde{\chi}^-_2$	0.177	0.211	
				$\tilde{\chi}^-_1\tilde{\chi}^+_2$	0.177	0.211	
A^0	1443.0	1489.2	1571.6	$b\bar{b}$	0.151	0.094	0.720
				$t\bar{t}$	0.033	0.034	0.190
				$\tilde{\chi}^0_1\tilde{\chi}^0_1$	0.080		
				$\tilde{\chi}^0_1\tilde{\chi}^0_4$	0.069		
				$\tilde{\chi}^0_2\tilde{\chi}^0_2$		0.046	
				$\tilde{\chi}^0_2\tilde{\chi}^0_4$	0.086	0.064	
				$\tilde{\chi}^0_3\tilde{\chi}^0_2$		0.062	
				$\tilde{\chi}^0_3\tilde{\chi}^0_4$	0.033		
				$\tilde{\chi}^0_4\tilde{\chi}^0_4$		0.044	
				$\tilde{\chi}^+_1\tilde{\chi}^-_1$	0.143	0.114	
				$\tilde{\chi}^+_2\tilde{\chi}^-_2$	0.035	0.044	
				$\tilde{\chi}^+_1\tilde{\chi}^-_2$	0.152	0.181	
				$\tilde{\chi}^-_1\tilde{\chi}^+_2$	0.152	0.181	
H^+	1446.2	1491.2	1574.6	$t\bar{b}$	0.167	0.125	0.912
				$\tilde{\chi}^+_1\tilde{\chi}^0_1$		0.045	
				$\tilde{\chi}^+_1\tilde{\chi}^0_2$	0.030		
				$\tilde{\chi}^+_1\tilde{\chi}^0_3$	0.098	0.219	
				$\tilde{\chi}^+_1\tilde{\chi}^0_4$	0.191	0.229	
				$\tilde{\chi}^+_2\tilde{\chi}^0_1$	0.186	0.034	
				$\tilde{\chi}^+_2\tilde{\chi}^0_2$	0.186	0.295	
				$\tilde{\chi}^+_2\tilde{\chi}^0_3$	0.104	0.034	

Table 4: Higgs masses (GeV) and significant branching ratios ($>3\%$) from Isajet (I), Susygen (S) and Pythia (P)

particle	m_I	m_S	m_P	decay	$\mathcal{B}_I$	$\mathcal{B}_S$	$\mathcal{B}_P$
$\tilde{t}_1$	1003.9	1022.4	882.7	$\tilde{g}t$	0.119	0.233	
				$\tilde{\chi}_1^0 t$	0.112	0.053	0.214
				$\tilde{\chi}_2^0 t$	0.225		
				$\tilde{\chi}_3^0 t$	0.089	0.172	0.178
				$\tilde{\chi}_4^0 t$	0.036	0.142	0.113
				$\tilde{\chi}_1^+ b$	0.342	0.055	0.059
				$\tilde{\chi}_2^+ b$	0.077	0.321	0.409
$\tilde{t}_2$	1307.4	1340.1	1274.0	$\tilde{g}t$	0.456	0.376	0.420
				$\tilde{\chi}_1^+ b$	0.034	0.140	0.183
				$\tilde{\chi}_2^+ b$	0.129	0.202	
				$\tilde{\chi}_1^0 t$	0.051		
				$\tilde{\chi}_2^0 t$	0.145	0.051	0.088
				$\tilde{\chi}_3^0 t$	0.052	0.113	0.112
				$\tilde{\chi}_4^0 t$	0.109	0.117	0.128
$\tilde{b}_1$	1296.6	1334.9	1259.8	$\tilde{\chi}_2^0 b$		0.080	0.087
				$\tilde{\chi}_4^0 b$	0.063		
				$\tilde{g}b$	0.468	0.670	0.464
				$\tilde{\chi}_1^- t$	0.207	0.151	0.167
				$\tilde{\chi}_2^- t$	0.216	0.057	0.224
				$W^- \tilde{t}_1$			0.051
$\tilde{b}_2$	1520.1	1570.6	1530.2	$\tilde{g}b$	0.948	0.921	0.980

Table 5: Light squark masses (GeV) and significant branching ratios ($> 3\%$) from Isajet (I), Susygen (S) and Pythia (P)

3 SPS 3 – mSUGRA scenario

m_0	90 GeV
$m_{1/2}$	400 GeV
A_0	0 GeV
$\tan\beta$	10
sign μ	+

model line into
'coannihilation region'
$m_0 = 0.25\, m_{1/2} - 10$ GeV

3.1 Spectrum & parameters of ISAJET 7.58

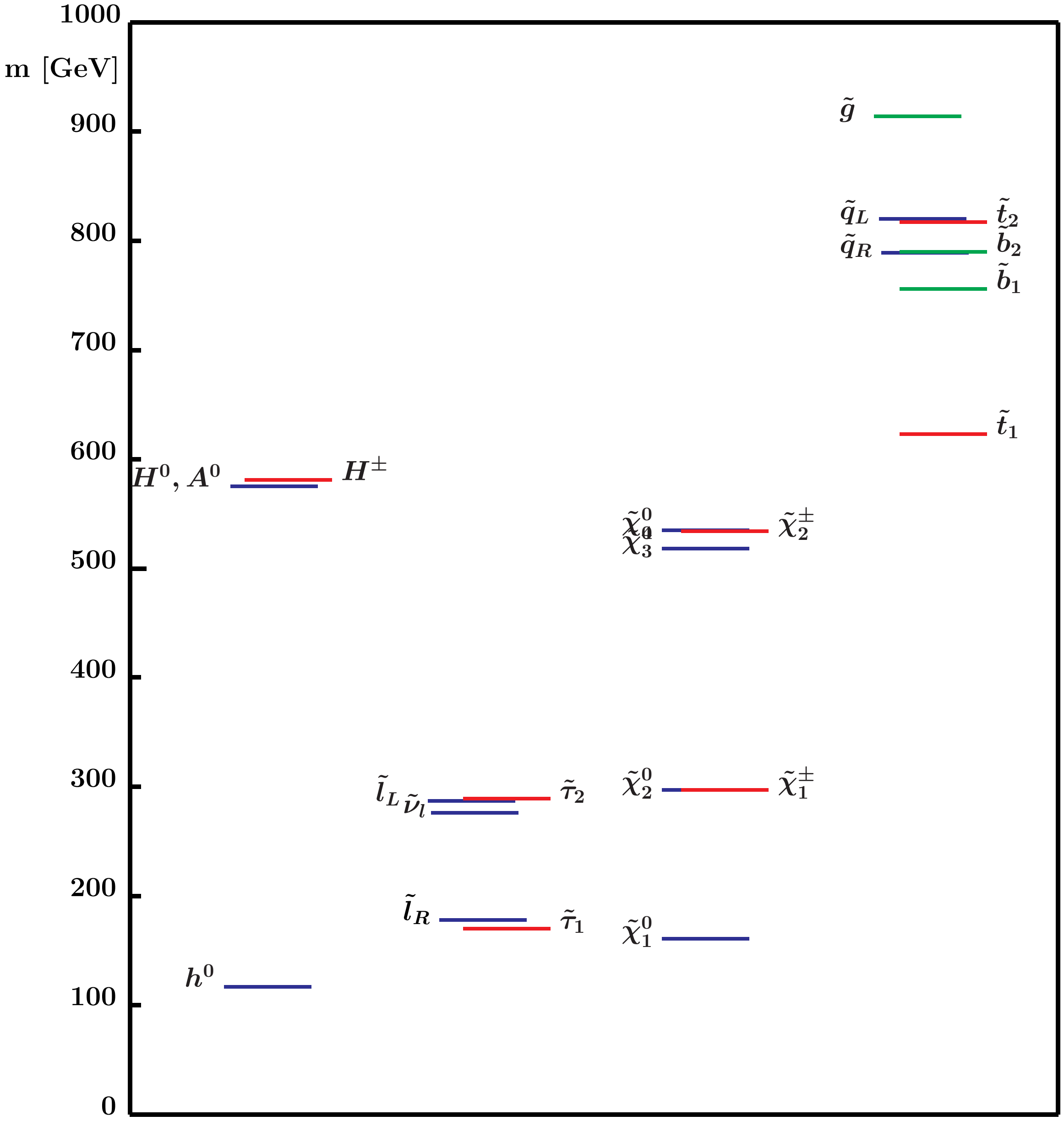

Figure 1: SPS 3 mass spectrum of ISAJET

Isajet parameters

```
Minimal supergravity (mSUGRA) model:

M_0,  M_(1/2),  A_0,  tan(beta),  sgn(mu),  M_t =
   90.000   400.000     0.000    10.000     1.0   175.000

ISASUGRA unification:
M_GUT      = 0.166E+17   g_GUT          =0.711      alpha_GUT =0.040
FT_GUT     = 0.473       FB_GUT         = 0.047     FL_GUT = 0.070

1/alpha_em =  127.72     sin**2(thetaw) =0.2304     alpha_s   =0.121
M_1        =  162.83     M_2            =  311.38   M_3       =  894.68
mu(Q)      =  508.59     B(Q)           =   64.52   Q         =  703.81
M_H1^2     = 0.700E+05   M_H2^2         =-0.248E+06

ISAJET masses (with signs):
M(GL)  =   914.26
M(UL)  =   816.57   M(UR)  =   791.78   M(DL)  =   820.39   M(DR) =   789.34
M(B1)  =   757.50   M(B2)  =   791.35   M(T1)  =   623.83   M(T2) =   819.54
M(SN)  =   275.99   M(EL)  =   287.11   M(ER)  =   178.33
M(NTAU)=   275.11   M(TAU1)=   170.59   M(TAU2)=   289.22
M(Z1)  =  -160.55   M(Z2)  =  -296.95   M(Z3)  =   512.87   M(Z4) =  -529.57
M(W1)  =  -296.85   M(W2)  =  -529.51
M(HL)  =   116.95   M(HH)  =   573.03   M(HA)  =   572.42   M(H+) =   578.30

theta_t=   1.0446   theta_b=   0.4105   theta_l=   1.3960   alpha_h=   0.1052

NEUTRALINO MASSES (SIGNED) =  -160.555  -296.949   512.872  -529.573
EIGENVECTOR 1       =   0.04140  -0.10275  -0.02726   0.99347
EIGENVECTOR 2       =   0.15060  -0.23308  -0.95905  -0.05670
EIGENVECTOR 3       =   0.70876   0.70153  -0.06164   0.04133
EIGENVECTOR 4       =   0.68794  -0.66556   0.27510  -0.08996

CHARGINO MASSES (SIGNED)  =  -296.846  -529.512
GAMMAL, GAMMAR             =   1.91245   1.78958


ISAJET equivalent input:
MSSMA:   914.26  508.59  572.42   10.00
MSSMB:   818.29  788.94  792.57  283.27  172.98
MSSMC:   760.72  785.64  661.24  282.42  170.03 -733.51-1042.16 -246.11
MSSMD: SAME AS MSSMB (DEFAULT)
MSSME:   162.83  311.38
```

3.2 Spectrum & parameters of SUSYGEN 3.00/27

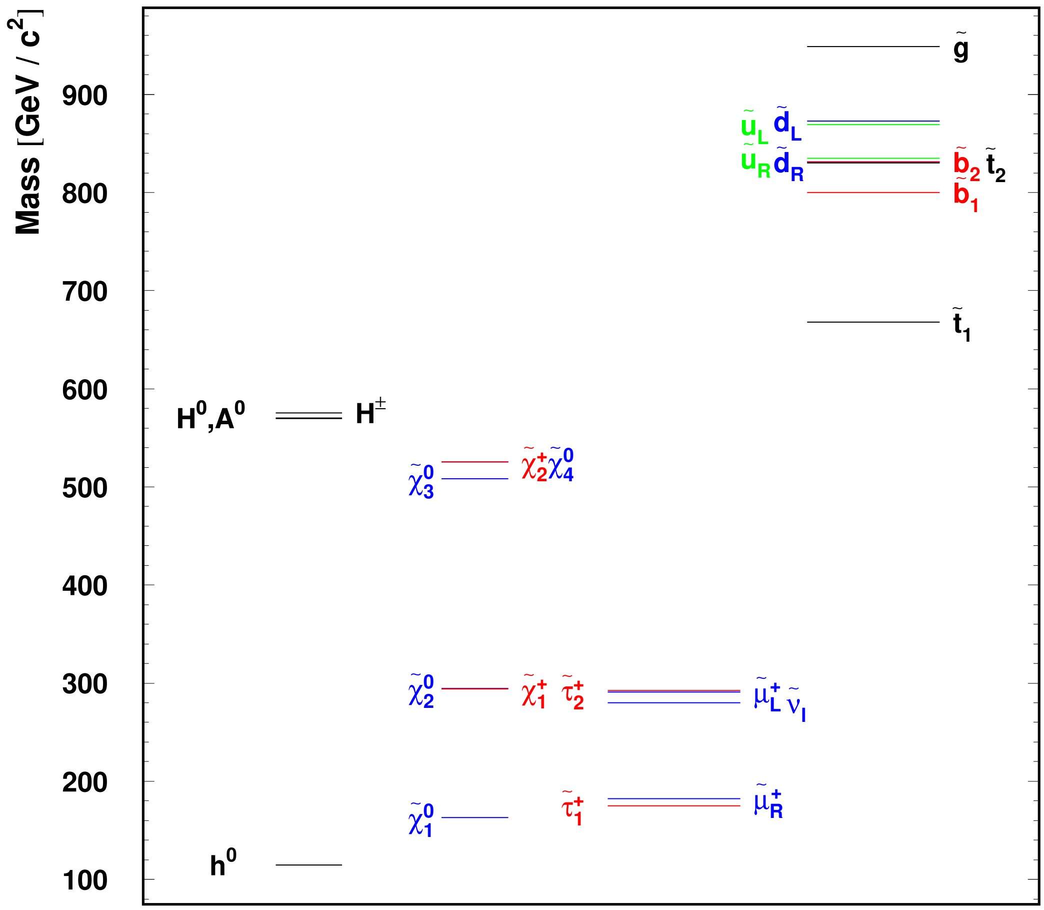

Figure 2: SPS 3 mass spectrum of SUSYGEN

Susygen parameters

```
Susygen inputs:
--------------

m0      =    90.000   TANB     =    10.000
m1/2    =   400.000    mu/|mu| =     1
A0      =     0.000

Sparticle masses:
----------------

SUPR      835.  SUPL       869.
SDNR      831.  SDNL       873.
SELR      182.  SELL       291.
SNU       280.
STP1      668.  STP2       830. cosmix =  0.427
SBT1      800.  SBT2       831. cosmix =  0.929
STA1      175.  STA2       293. cosmix=   0.170
SGLU      949.

Gaugino masses:
--------------

M1 =    165.439 M2 =    309.159 M3 =    910.421

NEUTRALINO m, CP, ph/zi/ha/hb 1 =  163.1  1.  0.857 -0.503  0.053  0.100
NEUTRALINO m, CP, ph/zi/ha/hb 2 =  294.5  1. -0.513 -0.811  0.175  0.219
NEUTRALINO m, CP, ph/zi/ha/hb 3 =  508.5 -1. -0.006  0.075 -0.635  0.768
NEUTRALINO m, CP, ph/zi/ha/hb 4 =  525.5  1. -0.053 -0.288 -0.750 -0.593

CHARGINO MASSES    =   294.202   525.434
CHARGINO ETA      =    -1.000     1.000

U matrix      WINO      HIGGSINO      V matrix      WINO     HIGGSINO
W1SS+        -0.941     0.339         W1SS-         0.976    -0.220
W2SS+         0.339     0.941         W2SS-         0.220     0.976


Higgses masses:
--------------

Light CP-even Higgs =   114.496
Heavy CP-even Higgs =   569.934
      CP-odd  Higgs =   570.032
      Charged Higgs =   575.354
      sin(a-b)      =    -0.105
      cos(a-b)      =     0.994
```

3.3 Spectrum & parameters of PYTHIA 6.2/00

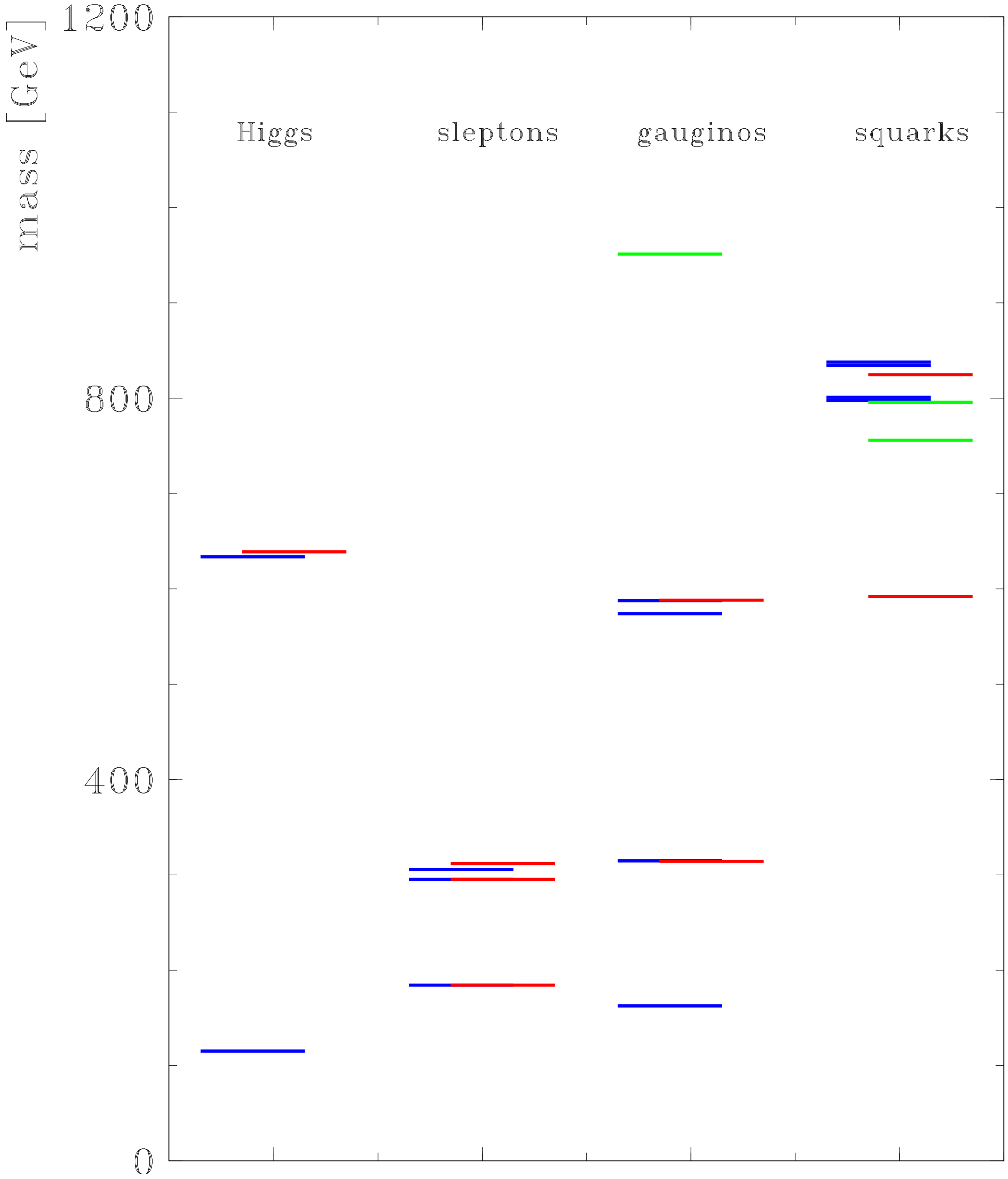

Figure 3: SPS 3 mass spectrum of PYTHIA

Pythia parameters

```
SUGRA input parameters
----------------------
 m_0          RMSS( 8) =   90.00
 m_1/2        RMSS( 1) =   400.0
 A_0          RMSS(16) =   0.000
 tan_beta     RMSS( 5) =   10.00
 sign mu      RMSS( 4) =   1.000

 sparticle masses & widths
 -------------------------
 M_se_R   184.4 ( 0.046)   M_se_L   305.8 ( 0.185)   M_sne_L  295.2 ( 0.196)
 M_sm_R   184.4 ( 0.046)   M_sm_L   305.8 ( 0.185)   M_snm_L  295.2 ( 0.196)
 M_st_1   184.2 ( 0.045)   M_st_2   311.9 ( 0.246)   M_snt_L  295.0 ( 0.227)

 M_ch0_1  162.5 ( 0.000)   M_ch0_2  314.7 ( 0.103)   M_ch0_3  573.9 ( 3.857)
 M_ch0_4  587.5 ( 4.406)
 M_ch+_1  314.4 ( 0.100)   M_ch+_2  587.9 ( 4.398)

 M_h0     114.9 ( 0.004)   M_H0     633.8 ( 1.470)   M_A0     633.7 ( 1.531)
 M_H+     638.9 ( 1.511)

 M_g~     951.2 (21.123)
 M_uL     834.6 ( 7.816)   M_uR     800.8 ( 1.684)   M_dL     837.9 ( 7.677)
 M_dR     797.5 ( 0.419)
 M_b1     756.0 ( 7.559)   M_b2     795.7 ( 1.538)   M_t1     591.7 ( 2.509)
 M_t2     824.7 (12.076)

 parameter settings IMSS, RMSS
 -----------------------------
 IMSS( 1) = 2   IMSS( 4) = 1   IMSS( 7) = 0   IMSS(10) = 0
 IMSS( 2) = 0   IMSS( 5) = 0   IMSS( 8) = 0   IMSS(11) = 0
 IMSS( 3) = 0   IMSS( 6) = 0   IMSS( 9) = 0   IMSS(12) = 0

 RMSS( 1) =   400.0       RMSS( 9) =   700.0       RMSS(17) =   0.000
 RMSS( 2) =   326.5       RMSS(10) =   757.1       RMSS(18) = -0.1040
 RMSS( 3) =   914.1       RMSS(11) =   792.1       RMSS(19) =   634.1
 RMSS( 4) =   570.0       RMSS(12) =   638.0       RMSS(20) =  0.4100E-01
 RMSS( 5) =   10.00       RMSS(13) =   305.6       RMSS(21) =   1.000
 RMSS( 6) =   305.8       RMSS(14) =   183.8       RMSS(22) =   800.0
 RMSS( 7) =   184.4       RMSS(15) =   0.000       RMSS(23) =  0.1000E+05
 RMSS( 8) =   90.00       RMSS(16) =  -813.6       RMSS(24) =  0.1000E+05
```

3.4 Decay modes

particle	m_I	m_S	m_P	decay	$\mathcal{B}_I$	$\mathcal{B}_S$	$\mathcal{B}_P$
$\tilde{e}_R^-$	178.3	182.1	184.4	$\tilde{\chi}_1^0 e^-$	1.000	1.000	1.000
$\tilde{e}_L^-$	287.1	290.8	305.8	$\tilde{\chi}_1^0 e^-$	1.000	1.000	1.000
$\tilde{\nu}_e$	276.0	279.8	295.2	$\tilde{\chi}_1^0 \nu_e$	1.000	1.000	1.000
$\tilde{\mu}_R^-$	178.3	182.1	184.4	$\tilde{\chi}_1^0 \mu^-$	1.000	1.000	1.000
$\tilde{\mu}_L^-$	287.1	290.8	305.8	$\tilde{\chi}_1^0 \mu^-$	1.000	1.000	1.000
$\tilde{\nu}_\mu$	276.0	279.8	295.2	$\tilde{\chi}_1^0 \nu_\mu$	1.000	1.000	1.000
$\tilde{\tau}_1^-$	170.6	175.0	184.2	$\tilde{\chi}_1^0 \tau^-$	1.000	1.000	1.000
$\tilde{\tau}_2^-$	289.2	292.7	311.9	$\tilde{\chi}_1^0 \tau^-$	0.873	1.000	0.847
				$Z^0 \tilde{\tau}_1^-$	0.082		0.094
				$h^0 \tilde{\tau}_1^-$	0.045		0.059
$\tilde{\nu}_\tau$	275.1	278.9	295.2	$\tilde{\chi}_1^0 \nu_\tau$	0.872	1.000	0.862
				$W^+ \tilde{\tau}_1^-$	0.128		0.138

Table 1: Slepton masses (GeV) and significant branching ratios (> 3%) from Isajet (I), Susygen (S) and Pythia (P)

particle	m_I	m_S	m_P	decay	$\mathcal{B}_I$	$\mathcal{B}_S$	$\mathcal{B}_P$
$\tilde{\chi}_1^0$	160.6	163.1	162.5		1.000	1.000	1.000
$\tilde{\chi}_2^0$	296.9	294.5	314.7	$\tilde{\chi}_1^0 h^0$	0.089	0.140	0.098
				$\tilde{\tau}_1^- \tau^+$	0.121	0.177	0.126
				$\tilde{\tau}_1^+ \tau^-$	0.121	0.177	0.126
				$\tilde{\nu}_e \bar{\nu}_e$	0.083	0.067	0.088
				$\bar{\tilde{\nu}}_e \nu_e$	0.083	0.067	0.088
				$\tilde{\nu}_\mu \bar{\nu}_\mu$	0.083	0.067	0.088
				$\bar{\tilde{\nu}}_\mu \nu_\mu$	0.083	0.067	0.088
				$\tilde{\nu}_\tau \bar{\nu}_\tau$	0.090	0.074	0.089
				$\bar{\tilde{\nu}}_\tau \nu_\tau$	0.090	0.074	0.089
$\tilde{\chi}_3^0$	512.9	508.5	573.9	$\tilde{\chi}_1^+ W^-$	0.295	0.334	0.298
				$\tilde{\chi}_1^- W^+$	0.295	0.334	0.298
				$\tilde{\chi}_1^0 Z^0$	0.105	0.086	0.092
				$\tilde{\chi}_2^0 Z^0$	0.245	0.197	0.253
$\tilde{\chi}_4^0$	529.6	525.5	587.5	$\tilde{\chi}_1^+ W^-$	0.272	0.306	0.278
				$\tilde{\chi}_1^- W^+$	0.272	0.306	0.278
				$\tilde{\chi}_1^0 h^0$	0.074	0.063	0.069
				$\tilde{\chi}_2^0 h^0$	0.176	0.150	0.206

Table 2: Neutralino masses (GeV) and significant branching ratios (> 3%) from Isajet (I), Susygen (S) and Pythia (P)

particle	m_I	m_S	m_P	decay	$\mathcal{B}_I$	$\mathcal{B}_S$	$\mathcal{B}_P$
$\tilde{\chi}_1^+$	296.8	294.2	314.4	$\tilde{\chi}_1^0 W^+$	0.108	0.450	0.111
				$\tilde{\nu}_e e^+$	0.185	0.169	0.189
				$\tilde{\nu}_\mu \mu^+$	0.185	0.169	0.189
				$\tilde{\nu}_\tau \tau^+$	0.202	0.189	0.194
				$\tilde{e}_L^+ \nu_e$	0.039		0.037
				$\tilde{\mu}_L^+ \nu_\mu$	0.039		0.037
				$\tilde{\tau}_1^+ \nu_\tau$	0.219		0.240
$\tilde{\chi}_2^+$	529.5	525.4	587.9	$\tilde{\chi}_1^0 W^+$	0.080	0.087	0.081
				$\tilde{\chi}_2^0 W^+$	0.291	0.322	0.296
				$\tilde{e}_L^+ \nu_e$	0.035	0.038	
				$\tilde{\mu}_L^+ \nu_\mu$	0.035	0.038	
				$\tilde{\tau}_2^+ \nu_\tau$	0.039	0.039	
				$\tilde{\chi}_1^+ Z^0$	0.260	0.415	0.270
				$\tilde{\chi}_1^+ h^0$	0.201		0.226

Table 3: Chargino masses (GeV) and significant branching ratios (> 3%) from Isajet (I), Susygen (S) and Pythia (P)

particle	m_I	m_S	m_P	decay	$\mathcal{B}_I$	$\mathcal{B}_S$	$\mathcal{B}_P$
h^0	117.0	114.5	114.9	$\tau^-\tau^+$	0.049	0.077	0.065
				$b\bar{b}$	0.820	0.761	0.777
				$c\bar{c}$	0.037		0.045
				gg		0.066	0.038
				W^+W^-		0.062	0.063
H^0	573.0	569.9	633.8	$\tau^-\tau^+$	0.061	0.096	0.090
				$b\bar{b}$	0.799	0.693	0.764
				$t\bar{t}$	0.113	0.164	0.139
A^0	572.4	570.0	633.7	$\tau^-\tau^+$	0.057	0.088	0.086
				$b\bar{b}$	0.748	0.638	0.735
				$t\bar{t}$	0.144	0.202	0.176
				$\tilde{\chi}_1^0\tilde{\chi}_2^0$	0.037		
H^+	578.3	575.4	638.9	$\nu_\tau \tau^+$	0.072	0.095	0.088
				$t\bar{b}$	0.861	0.820	0.910
				$\tilde{\chi}_1^+\tilde{\chi}_1^0$	0.057	0.078	

Table 4: Higgs masses (GeV) and significant branching ratios (> 3%) from Isajet (I), Susygen (S) and Pythia (P)

particle	m_I	m_S	m_P	decay	$\mathcal{B}_I$	$\mathcal{B}_S$	$\mathcal{B}_P$
$\tilde{t}_1$	623.8	667.7	591.7	$\tilde{\chi}_1^0 t$	0.231	0.189	0.311
				$\tilde{\chi}_2^0 t$	0.159	0.128	0.155
				$\tilde{\chi}_1^+ b$	0.483	0.390	0.534
				$\tilde{\chi}_2^+ b$	0.128	0.294	
$\tilde{t}_2$	819.5	830.4	824.8	$\tilde{\chi}_1^+ b$	0.206	0.220	0.223
				$\tilde{\chi}_2^+ b$	0.157	0.330	0.107
				$Z^0 \tilde{t}_1$	0.143		0.259
				$h^0 \tilde{t}_1$	0.053		0.069
				$\tilde{\chi}_2^0 t$	0.090	0.071	0.096
				$\tilde{\chi}_3^0 t$	0.088	0.172	0.051
				$\tilde{\chi}_4^0 t$	0.238	0.195	0.166
$\tilde{b}_1$	757.5	800.2	756.0	$\tilde{\chi}_1^0 b$		0.037	
				$\tilde{\chi}_2^0 b$	0.233	0.311	0.249
				$\tilde{\chi}_1^- t$	0.373	0.555	0.395
				$\tilde{\chi}_2^- t$	0.224	0.051	
				$W^- \tilde{t}_1$	0.127		0.333
$\tilde{b}_2$	791.3	831.3	795.7	$\tilde{\chi}_1^0 b$	0.125	0.168	0.255
				$\tilde{\chi}_2^0 b$	0.087	0.078	0.123
				$\tilde{\chi}_3^0 b$	0.041	0.137	
				$\tilde{\chi}_4^0 b$	0.058	0.165	
				$\tilde{\chi}_1^- t$	0.143	0.130	0.203
				$\tilde{\chi}_2^- t$	0.356	0.322	0.101
				$W^- \tilde{t}_1$	0.189		0.315

Table 5: Light squark masses (GeV) and significant branching ratios (> 3%) from Isajet (I), Susygen (S) and Pythia (P)

4 SPS 4 – mSUGRA scenario

m_0	400 GeV
$m_{1/2}$	300 GeV
A_0	0 GeV
$\tan\beta$	50
sign μ	$+$

'large $\tan\beta$' scenario

4.1 Spectrum & parameters of ISAJET 7.58

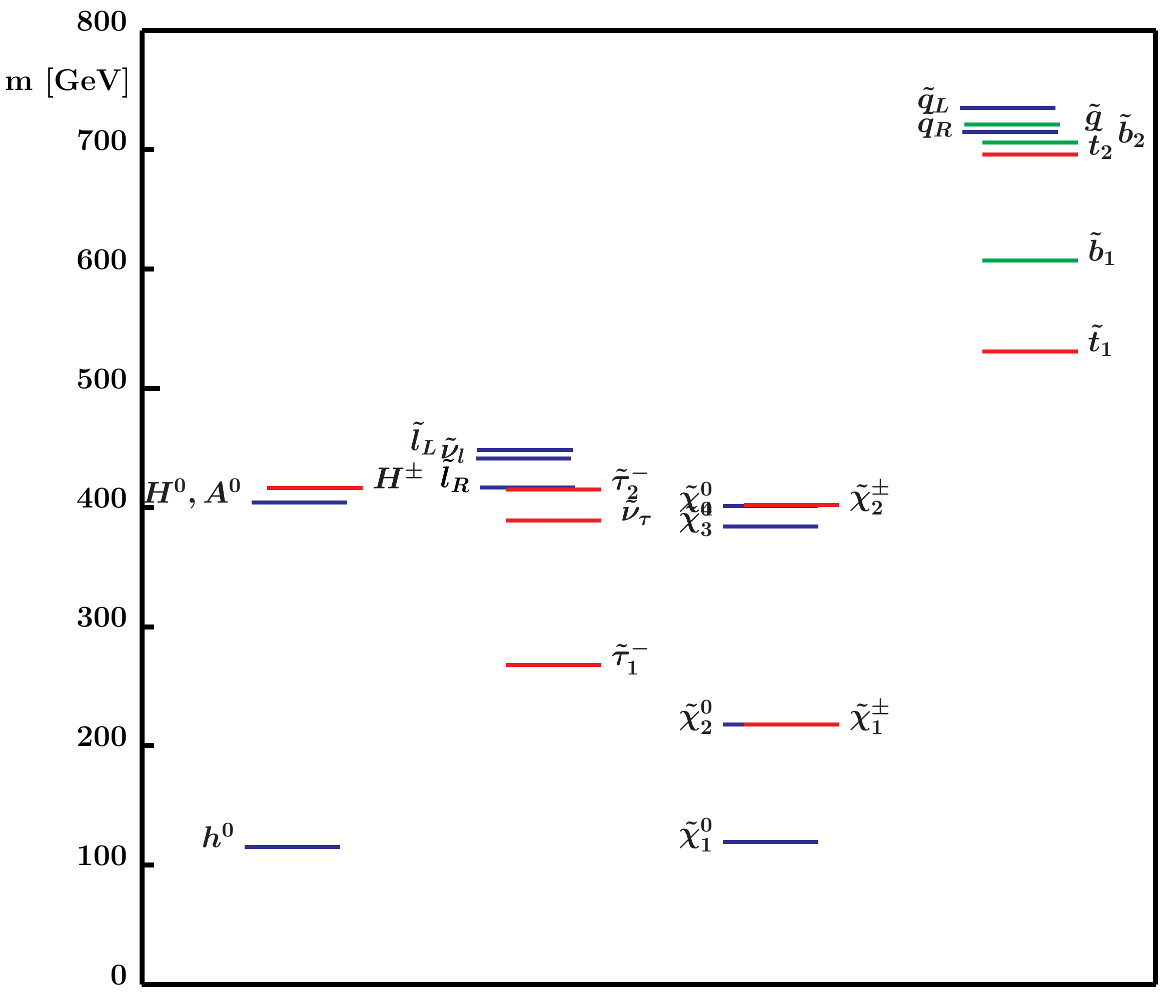

Figure 1: SPS 4 mass spectrum of ISAJET

ISAJET parameters

```
Minimal supergravity (mSUGRA) model:

M_0,  M_(1/2),  A_0,  tan(beta),  sgn(mu),  M_t =
  400.000   300.000     0.000    50.000     1.0   175.000

ISASUGRA unification:
M_GUT      = 0.211E+17   g_GUT          =0.710      alpha_GUT =0.040
FT_GUT     = 0.486       FB_GUT         = 0.186     FL_GUT = 0.463

1/alpha_em =  127.73     sin**2(thetaw) =0.2310     alpha_s   =0.119
M_1        =  120.80     M_2            =  233.17   M_3       =  689.41
mu(Q)      =  377.03     B(Q)           =   13.05   Q         =  571.25
M_H1^2     = 0.602E+05   M_H2^2         =-0.140E+06

ISAJET masses (with signs):
M(GL)  =   721.03
M(UL)  =   730.24   M(UR)  =   715.10   M(DL)  =   734.59   M(DR) =   714.32
M(B1)  =   606.86   M(B2)  =   706.45   M(T1)  =   530.58   M(T2) =   695.88
M(SN)  =   441.22   M(EL)  =   448.40   M(ER)  =   416.54
M(NTAU)=   389.43   M(TAU1)=   267.61   M(TAU2)=   414.91
M(Z1)  =  -118.66   M(Z2)  =  -218.14   M(Z3)  =   383.91   M(Z4) =  -401.08
M(W1)  =  -218.06   M(W2)  =  -402.28
M(HL)  =   115.39   M(HH)  =   404.63   M(HA)  =   404.43   M(H+) =   416.28

theta_t=   1.0387   theta_b=   0.6261   theta_l=   1.1998   alpha_h=   0.0204

NEUTRALINO MASSES (SIGNED) =  -118.657  -218.137   383.909  -401.079
EIGENVECTOR 1       =   0.04547  -0.13669  -0.03365   0.98900
EIGENVECTOR 2       =   0.17072  -0.28852  -0.93876  -0.07966
EIGENVECTOR 3       =  -0.70951  -0.69629   0.09011  -0.06055
EIGENVECTOR 4       =  -0.68219   0.64285  -0.33089   0.10895

CHARGINO MASSES (SIGNED)  =  -218.062  -402.275
GAMMAL, GAMMAR             =   1.99843   1.81882


ISAJET equivalent input:
MSSMA:   721.03  377.03  404.43   50.00
MSSMB:   732.20  713.87  716.00  445.90  414.23
MSSMC:   640.09  673.40  556.76  394.72  289.48 -552.20 -729.52 -102.27
MSSMD: SAME AS MSSMB (DEFAULT)
MSSME:   120.80  233.17
```

4.2 Spectrum & parameters of SUSYGEN 3.00/27

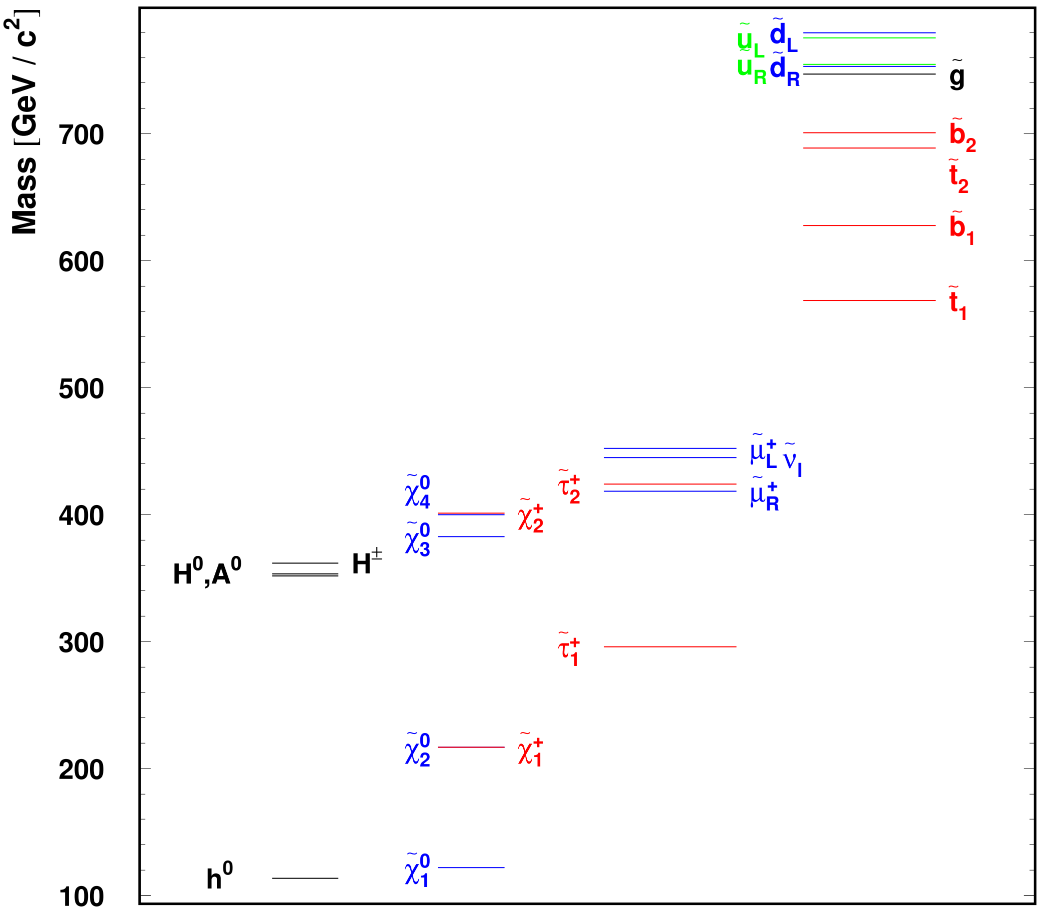

Figure 2: SPS 4 mass spectrum of SUSYGEN

SUSYGEN parameters

```
Susygen inputs:
--------------

m0      =   400.000   TANB     =    50.000
m1/2    =   300.000    mu/|mu| =     1
A0      =     0.000

Sparticle masses:
----------------

SUPR      755.  SUPL       775.
SDNR      753.  SDNL       779.
SELR      418.  SELL       452.
SNU       445.
STP1      569.  STP2       689. cosmix =  0.476
SBT1      628.  SBT2       701. cosmix =  0.762
STA1      296.  STA2       424. cosmix=   0.372
SGLU      747.

Gaugino masses:
--------------

M1 =    124.255 M2 =    232.053 M3 =    694.630


NEUTRALINO m, CP, ph/zi/ha/hb 1 =  122.0  1.  0.849 -0.508  0.050  0.138
NEUTRALINO m, CP, ph/zi/ha/hb 2 =  216.9  1. -0.525 -0.782  0.177  0.286
NEUTRALINO m, CP, ph/zi/ha/hb 3 =  382.6 -1. -0.009  0.109 -0.695  0.710
NEUTRALINO m, CP, ph/zi/ha/hb 4 =  400.0  1. -0.062 -0.345 -0.695 -0.628

CHARGINO MASSES    =   216.667   401.170
CHARGINO ETA       =    -1.000     1.000

U matrix      WINO      HIGGSINO   V matrix      WINO      HIGGSINO
W1SS+        -0.909     0.417      W1SS-         0.969    -0.246
W2SS+         0.417     0.909      W2SS-         0.246     0.969

Higgses masses:
--------------

Light CP-even Higgs =   113.437
Heavy CP-even Higgs =   351.833
      CP-odd  Higgs =   353.570
      Charged Higgs =   361.880
      sin(a-b)      =    -0.021
      cos(a-b)      =     1.000
```

4.3 Spectrum & parameters of PYTHIA 6.2/00

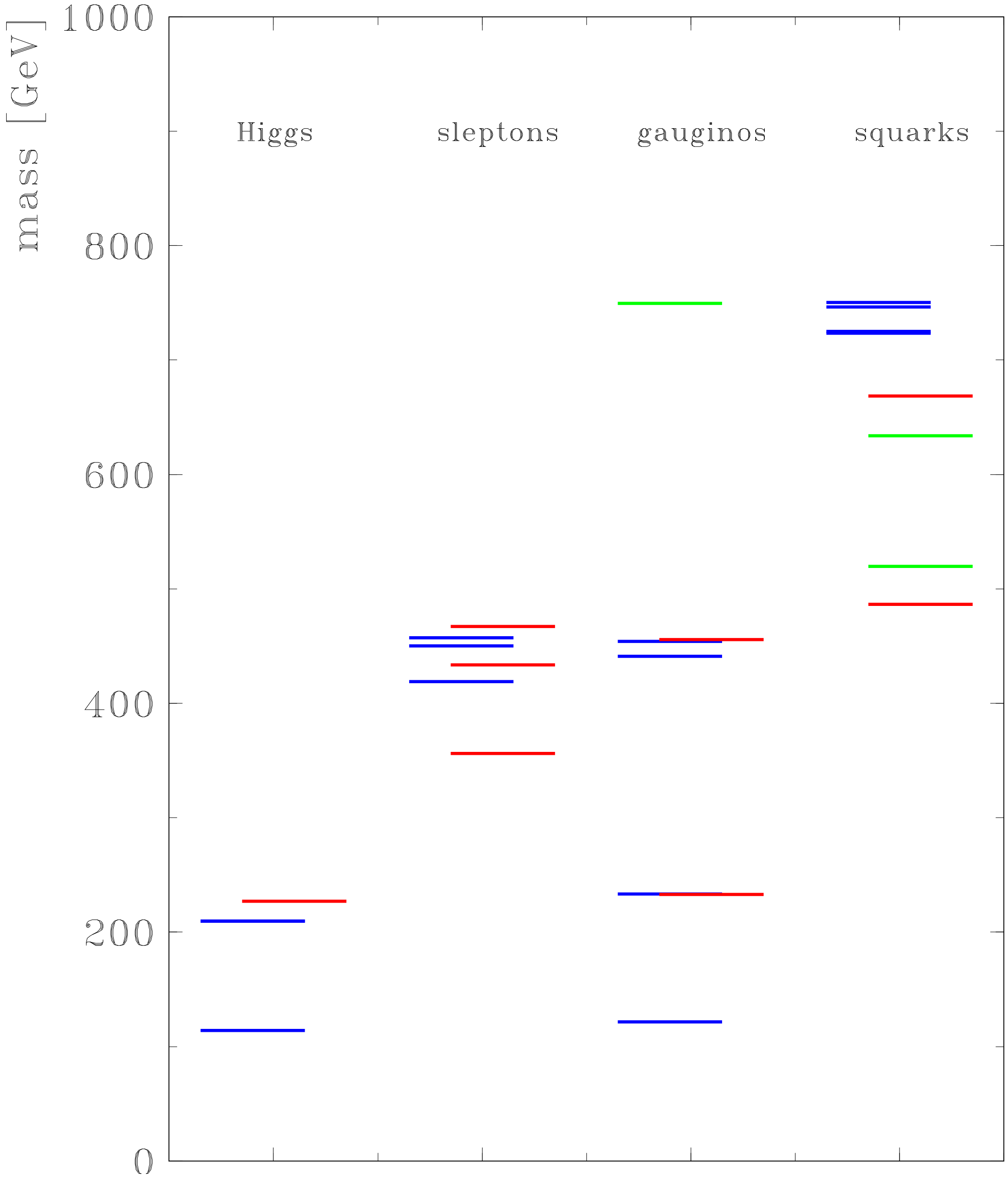

Figure 3: SPS 4 mass spectrum of PYTHIA

PYTHIA parameters

```
SUGRA input parameters
----------------------
m_0         RMSS( 8) =   400.0
m_1/2       RMSS( 1) =   300.0
A_0         RMSS(16) =   0.000
tan_beta    RMSS( 5) =   50.00
sign mu     RMSS( 4) =   1.000

sparticle masses & widths
-------------------------
M_se_R   418.8 ( 1.782)   M_se_L   457.2 ( 3.377)   M_sne_L  450.1 ( 3.396)
M_sm_R   418.8 ( 1.783)   M_sm_L   457.2 ( 3.377)   M_snm_L  450.1 ( 3.396)
M_st_1   356.4 ( 1.972)   M_st_2   467.2 ( 2.618)   M_snt_L  433.7 ( 3.243)

M_ch0_1  121.7 ( 0.000)   M_ch0_2  233.3 ( 0.001)   M_ch0_3  440.9 ( 2.634)
M_ch0_4  454.0 ( 2.855)
M_ch+_1  233.1 ( 0.005)   M_ch+_2  455.6 ( 3.020)

M_h0     114.1 ( 0.004)   M_H0     209.6 ( 7.886)   M_A0     209.8 ( 7.909)
M_H+     226.9 ( 3.453)

M_g~     749.4 ( 7.937)
M_uL     746.3 ( 7.718)   M_uR     725.0 ( 1.563)   M_dL     750.4 ( 7.534)
M_dR     723.4 ( 0.390)
M_b1     519.8 ( 1.335)   M_b2     634.0 ( 4.829)   M_t1     486.7 ( 2.672)
M_t2     668.7 (10.050)

parameter settings IMSS, RMSS
-----------------------------
IMSS( 1) = 2   IMSS( 4) = 1   IMSS( 7) = 0   IMSS(10) = 0
IMSS( 2) = 0   IMSS( 5) = 0   IMSS( 8) = 0   IMSS(11) = 0
IMSS( 3) = 0   IMSS( 6) = 0   IMSS( 9) = 0   IMSS(12) = 0

RMSS( 1) =   300.0       RMSS( 9) =   700.0       RMSS(17) =   0.000
RMSS( 2) =   244.9       RMSS(10) =   584.6       RMSS(18) = -0.2098E-01
RMSS( 3) =   706.3       RMSS(11) =   571.2       RMSS(19) =   210.0
RMSS( 4) =   434.8       RMSS(12) =   540.7       RMSS(20) =  0.4100E-01
RMSS( 5) =   50.00       RMSS(13) =   441.1       RMSS(21) =   1.000
RMSS( 6) =   457.2       RMSS(14) =   382.8       RMSS(22) =   800.0
RMSS( 7) =   418.8       RMSS(15) =   0.000       RMSS(23) =  0.1000E+05
RMSS( 8) =   400.0       RMSS(16) =  -614.3       RMSS(24) =  0.1000E+05
```

4.4 Decay modes

particle	m_I	m_S	m_P	decay	$\mathcal{B}_I$	$\mathcal{B}_S$	$\mathcal{B}_P$
$\tilde{e}_R^-$	416.5	418.3	418.8	$\tilde{\chi}_1^0 e^-$	0.996	0.995	0.996
$\tilde{e}_L^-$	448.4	452.0	457.2	$\tilde{\chi}_1^0 e^-$	0.127	0.122	0.136
				$\tilde{\chi}_2^0 e^-$	0.318	0.320	0.309
				$\tilde{\chi}_1^- \nu_e$	0.546	0.547	0.555
$\tilde{\nu}_e$	441.2	444.9	450.1	$\tilde{\chi}_1^0 \nu_e$	0.157	0.155	0.157
				$\tilde{\chi}_2^0 \nu_e$	0.250	0.250	0.261
				$\tilde{\chi}_1^+ e^-$	0.588	0.590	0.582
$\tilde{\mu}_R^-$	416.5	418.3	418.8	$\tilde{\chi}_1^0 \mu^-$	0.996	0.995	0.996
$\tilde{\mu}_L^-$	448.4	452.0	457.2	$\tilde{\chi}_1^0 \mu^-$	0.127	0.122	0.136
				$\tilde{\chi}_2^0 \mu^-$	0.318	0.320	0.309
				$\tilde{\chi}_1^- \nu_\mu$	0.546	0.547	0.555
$\tilde{\nu}_\mu$	441.2	444.9	450.1	$\tilde{\chi}_1^0 \nu_\mu$	0.157	0.155	0.157
				$\tilde{\chi}_2^0 \nu_\mu$	0.250	0.250	0.261
				$\tilde{\chi}_1^+ \mu^-$	0.588	0.590	0.582
$\tilde{\tau}_1^-$	267.6	296.0	356.4	$\tilde{\chi}_1^0 \tau^-$	0.836	0.742	0.631
				$\tilde{\chi}_2^0 \tau^-$	0.057	0.090	0.129
				$\tilde{\chi}_1^- \nu_\tau$	0.107	0.168	0.240
$\tilde{\tau}_2^-$	414.9	424.1	467.2	$\tilde{\chi}_1^0 \tau^-$	0.196	0.222	0.292
				$\tilde{\chi}_2^0 \tau^-$	0.263	0.308	0.261
				$\tilde{\chi}_1^- \nu_\tau$	0.378	0.437	0.407
				$Z^0 \tilde{\tau}_1^-$	0.088		0.031
				$h^0 \tilde{\tau}_1^-$	0.063		
$\tilde{\nu}_\tau$	389.4	400.8	433.7	$\tilde{\chi}_1^0 \nu_\tau$	0.152	0.171	0.157
				$\tilde{\chi}_2^0 \nu_\tau$	0.209	0.246	0.248
				$\tilde{\chi}_1^+ \tau^-$	0.542	0.583	0.595
				$W^+ \tilde{\tau}_1^-$	0.097		

Table 1: Slepton masses (GeV) and significant branching ratios ($> 3\%$) from Isajet (I), Susygen (S) and Pythia (P)

particle	m_I	m_S	m_P	decay	$\mathcal{B}_I$	$\mathcal{B}_S$	$\mathcal{B}_P$
$\tilde{\chi}_1^0$	118.7	122.0	121.7		1.000	1.000	1.000
$\tilde{\chi}_2^0$	218.1	216.9	233.3	$\tilde{\chi}_1^0 Z^0$	0.989	0.995	1.000
$\tilde{\chi}_3^0$	383.9	382.6	440.9	$\tilde{\chi}_1^+ W^-$	0.273	0.345	0.279
				$\tilde{\chi}_1^- W^+$	0.273	0.345	0.279
				$\tilde{\chi}_1^0 Z^0$	0.107	0.081	0.087
				$\tilde{\chi}_2^0 Z^0$	0.199	0.148	0.217
				$\tilde{\tau}_1^- \tau^+$	0.058		
				$\tilde{\tau}_1^+ \tau^-$	0.058		
$\tilde{\chi}_4^0$	401.1	400.0	454.0	$\tilde{\chi}_1^+ W^-$	0.312	0.364	0.285
				$\tilde{\chi}_1^- W^+$	0.312	0.364	0.285
				$\tilde{\chi}_1^0 h^0$	0.080	0.063	0.067
				$\tilde{\chi}_2^0 h^0$	0.160	0.125	0.184
				$\tilde{\tau}_1^- \tau^+$	0.042		
				$\tilde{\tau}_1^+ \tau^-$	0.042		

Table 2: Neutralino masses (GeV) and significant branching ratios ($> 3\%$) from Isajet (I), Susygen (S) and Pythia (P)

particle	m_I	m_S	m_P	decay	$\mathcal{B}_I$	$\mathcal{B}_S$	$\mathcal{B}_P$
$\tilde{\chi}_1^+$	218.1	216.7	233.1	$\tilde{\chi}_1^0 W^+$	0.998	1.000	1.000
$\tilde{\chi}_2^+$	402.3	401.2	455.6	$\tilde{\chi}_1^0 W^+$	0.100	0.103	0.082
				$\tilde{\chi}_2^0 W^+$	0.346	0.367	0.284
				$\tilde{\tau}_1^+ \nu_\tau$	0.071		
				$\tilde{\chi}_1^+ Z^0$	0.287	0.525	0.248
				$\tilde{\chi}_1^+ h^0$	0.194		0.194

Table 3: Chargino masses (GeV) and significant branching ratios ($> 3\%$) from Isajet (I), Susygen (S) and Pythia (P)

particle	m_I	m_S	m_P	decay	$\mathcal{B}_I$	$\mathcal{B}_S$	$\mathcal{B}_P$
h^0	115.4	113.4	114.1	$\tau^- \tau^+$	0.050	0.078	0.066
				$b\bar{b}$	0.822	0.766	0.780
				$c\bar{c}$	0.040		0.046
				gg	0.031	0.068	0.038
				$W^+ W^-$		0.055	0.058
H^0	404.6	351.8	209.6	$\tau^- \tau^+$	0.067	0.112	0.137
				$b\bar{b}$	0.928	0.885	0.861
A^0	404.4	353.6	209.8	$\tau^- \tau^+$	0.067	0.112	0.137
				$b\bar{b}$	0.926	0.883	0.861
H^+	416.3	361.9	226.9	$\nu_\tau \tau^+$	0.105	0.149	0.339
				$t\bar{b}$	0.886	0.844	0.658

Table 4: Higgs masses (GeV) and significant branching ratios ($> 3\%$) from Isajet (I), Susygen (S) and Pythia (P)

particle	m_I	m_S	m_P	decay	$\mathcal{B}_I$	$\mathcal{B}_S$	$\mathcal{B}_P$
$\tilde{t}_1$	530.6	568.5	486.7	$\tilde{\chi}_1^0 t$	0.150	0.127	0.192
				$\tilde{\chi}_2^0 t$	0.127	0.116	0.154
				$\tilde{\chi}_1^+ b$	0.468	0.396	0.631
				$\tilde{\chi}_2^+ b$	0.256	0.343	
$\tilde{t}_2$	695.9	688.8	668.7	$\tilde{\chi}_1^+ b$	0.209	0.207	0.156
				$\tilde{\chi}_2^+ b$	0.343	0.344	0.174
				$W^+\tilde{b}_1$			0.190
				$Z^0\tilde{t}_1$	0.057		0.158
				$\tilde{\chi}_1^0 t$			0.040
				$\tilde{\chi}_2^0 t$	0.058	0.054	0.063
				$\tilde{\chi}_3^0 t$	0.079	0.175	0.036
				$\tilde{\chi}_4^0 t$	0.210	0.209	0.175
$\tilde{b}_1$	606.9	627.5	519.8	$\tilde{\chi}_1^0 b$	0.072	0.060	0.139
				$\tilde{\chi}_2^0 b$	0.273	0.206	0.411
				$\tilde{\chi}_3^0 b$	0.166	0.204	
				$\tilde{\chi}_4^0 b$	0.099	0.133	
				$\tilde{\chi}_1^- t$	0.343	0.333	0.447
				$\tilde{\chi}_2^- t$	0.047	0.064	
$\tilde{b}_2$	706.5	700.7	634.0	$\tilde{\chi}_1^0 b$			0.042
				$\tilde{\chi}_2^0 b$	0.213	0.243	0.215
				$\tilde{\chi}_4^0 b$	0.208	0.220	
				$\tilde{\chi}_1^- t$			0.319
				$\tilde{\chi}_2^- t$	0.450	0.488	0.073
				$W^-\tilde{t}_1$	0.086		0.310
				$Z^0\tilde{b}_1$			0.033

Table 5: Light squark masses (GeV) and significant branching ratios ($> 3\%$) from Isajet (I), Susygen (S) and Pythia (P)

5 SPS 5 – mSUGRA scenario

m_0	150 GeV
$m_{1/2}$	300 GeV
A_0	-1000 GeV
$\tan\beta$	5
sign μ	+

'light stop' scenario

5.1 Spectrum & parameters of ISAJET 7.58

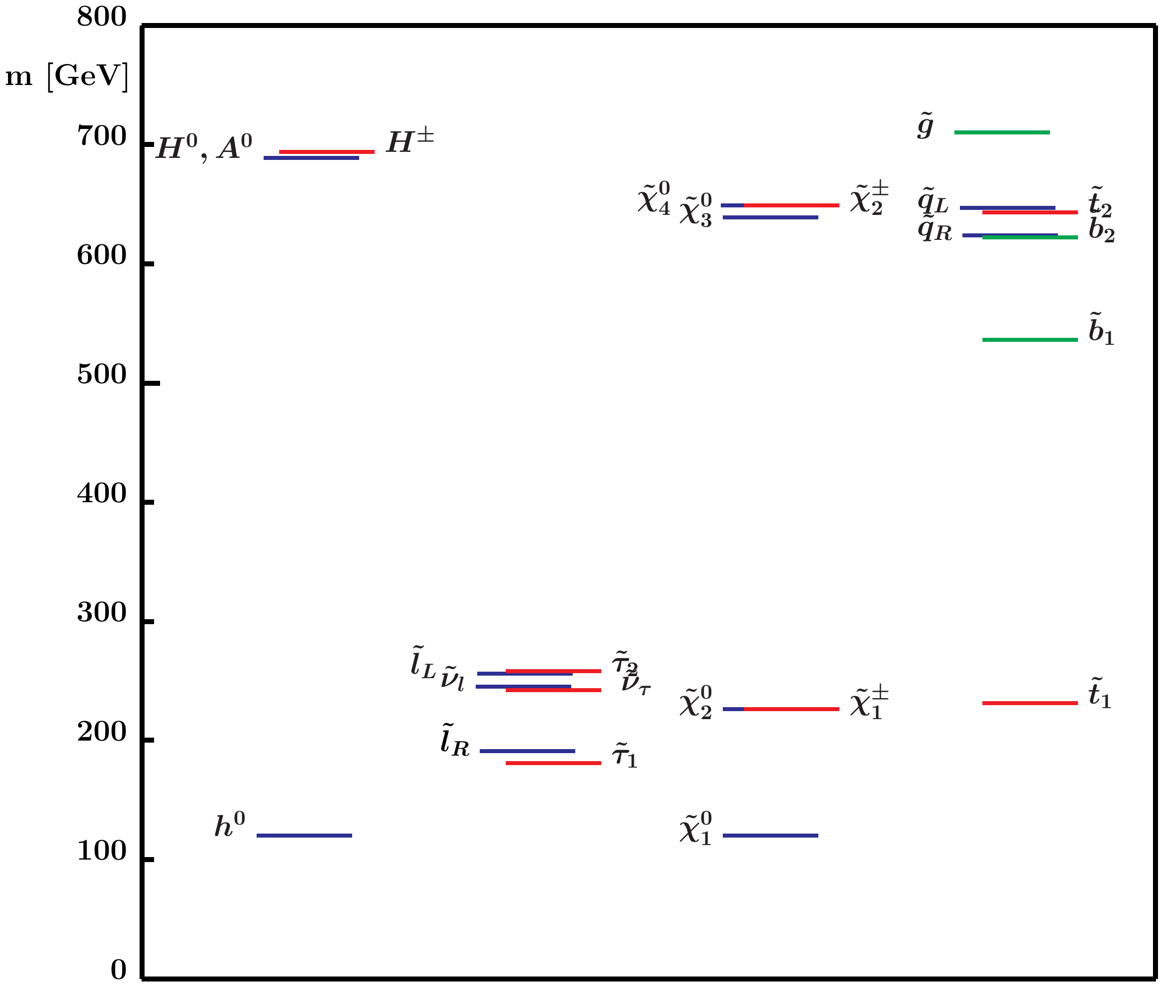

Figure 1: SPS 5 mass spectrum of Isajet

Isajet parameters

```
Minimal supergravity (mSUGRA) model:

M_0,  M_(1/2),  A_0,  tan(beta),  sgn(mu),  M_t =
  150.000   300.000 -1000.000     5.000     1.0   175.000

ISASUGRA unification:
M_GUT      = 0.190E+17   g_GUT          =0.713      alpha_GUT =0.040
FT_GUT     = 0.487       FB_GUT         = 0.023     FL_GUT = 0.035

1/alpha_em =  127.66     sin**2(thetaw) =0.2309     alpha_s   =0.119
M_1        =  121.39     M_2            =  234.56   M_3       =  694.68
mu(Q)      =  639.80     B(Q)           =  144.90   Q         =  449.79
M_H1^2     = 0.572E+05   M_H2^2         =-0.393E+06

ISAJET masses (with signs):
M(GL)  =   710.31
M(UL)  =   641.82   M(UR)  =   624.49   M(DL)  =   646.40   M(DR) =   623.38
M(B1)  =   535.86   M(B2)  =   622.99   M(T1)  =   220.74   M(T2) =   644.65
M(SN)  =   244.52   M(EL)  =   256.30   M(ER)  =   191.45
M(NTAU)=   242.34   M(TAU1)=   180.67   M(TAU2)=   257.86
M(Z1)  =  -119.51   M(Z2)  =  -226.33   M(Z3)  =   642.83   M(Z4) =  -652.95
M(W1)  =  -226.33   M(W2)  =  -652.68
M(HL)  =   119.79   M(HH)  =   694.03   M(HA)  =   693.86   M(H+) =   698.49

theta_t=   1.0031   theta_b=   0.1580   theta_l=   1.3356   alpha_h=   0.2069

NEUTRALINO MASSES (SIGNED) =  -119.510  -226.329   642.833  -652.949
EIGENVECTOR 1       =   0.02835  -0.07603  -0.02968   0.99626
EIGENVECTOR 2       =   0.07465  -0.14434  -0.98579  -0.04251
EIGENVECTOR 3       =  -0.70833  -0.70332   0.05073  -0.03201
EIGENVECTOR 4       =   0.70135  -0.69190   0.15735  -0.06807

CHARGINO MASSES (SIGNED)  =  -226.327  -652.683
GAMMAL, GAMMAR             =   1.77997   1.67887


ISAJET equivalent input:
MSSMA:   710.31  639.80  693.86    5.00
MSSMB:   643.88  622.91  625.44  252.24  186.76
MSSMC:   535.16  620.50  360.54  250.13  180.89 -905.63-1671.36-1179.34
MSSMD: SAME AS MSSMB (DEFAULT)
MSSME:   121.39  234.56
```

5.2 Spectrum & parameters of SUSYGEN 3.00/27

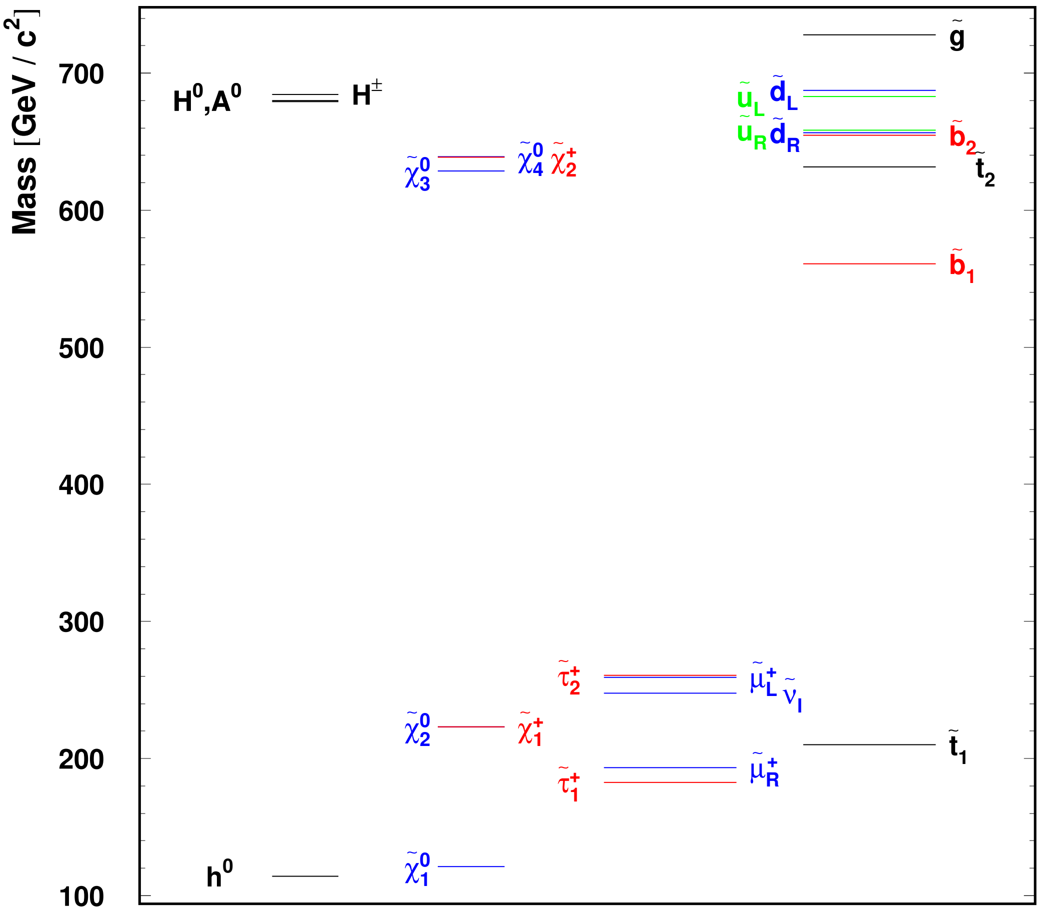

Figure 2: SPS 5 mass spectrum of Susygen

Susygen parameters

```
Susygen inputs:
--------------

m0      =   150.000   TANB     =     5.000
m1/2    =   300.000    mu/|mu| =     1
A0      = -1000.000

Sparticle masses:
----------------

SUPR      658.  SUPL       683.
SDNR      656.  SDNL       687.
SELR      193.  SELL       259.
SNU       248.
STP1      210.  STP2       632. cosmix =  0.513
SBT1      561.  SBT2       654. cosmix =  0.992
STA1      183.  STA2       261. cosmix=   0.226
SGLU      728.


Gaugino masses:
--------------

M1 =    123.173 M2 =    231.684 M3 =    712.143

NEUTRALINO m, CP, ph/zi/ha/hb 1 =  121.2  1.  0.858 -0.507  0.045  0.071
NEUTRALINO m, CP, ph/zi/ha/hb 2 =  223.1  1. -0.514 -0.841  0.105  0.130
NEUTRALINO m, CP, ph/zi/ha/hb 3 =  628.5 -1. -0.004  0.061 -0.557  0.828
NEUTRALINO m, CP, ph/zi/ha/hb 4 =  639.0  1. -0.016 -0.176 -0.823 -0.540

CHARGINO MASSES    =   222.964   638.753
CHARGINO ETA      =     -1.000     1.000

U matrix      WINO      HIGGSINO      V matrix      WINO     HIGGSINO
W1SS+        -0.977     0.214         W1SS-         0.994    -0.112
W2SS+         0.214     0.977         W2SS-         0.112     0.994

Higgses masses:
--------------

Light CP-even Higgs =   113.925
Heavy CP-even Higgs =   679.220
      CP-odd  Higgs =   679.964
      Charged Higgs =   684.484
      sin(a-b)      =    -0.205
      cos(a-b)      =     0.979
```

5.3 Spectrum & parameters of PYTHIA 6.2/00

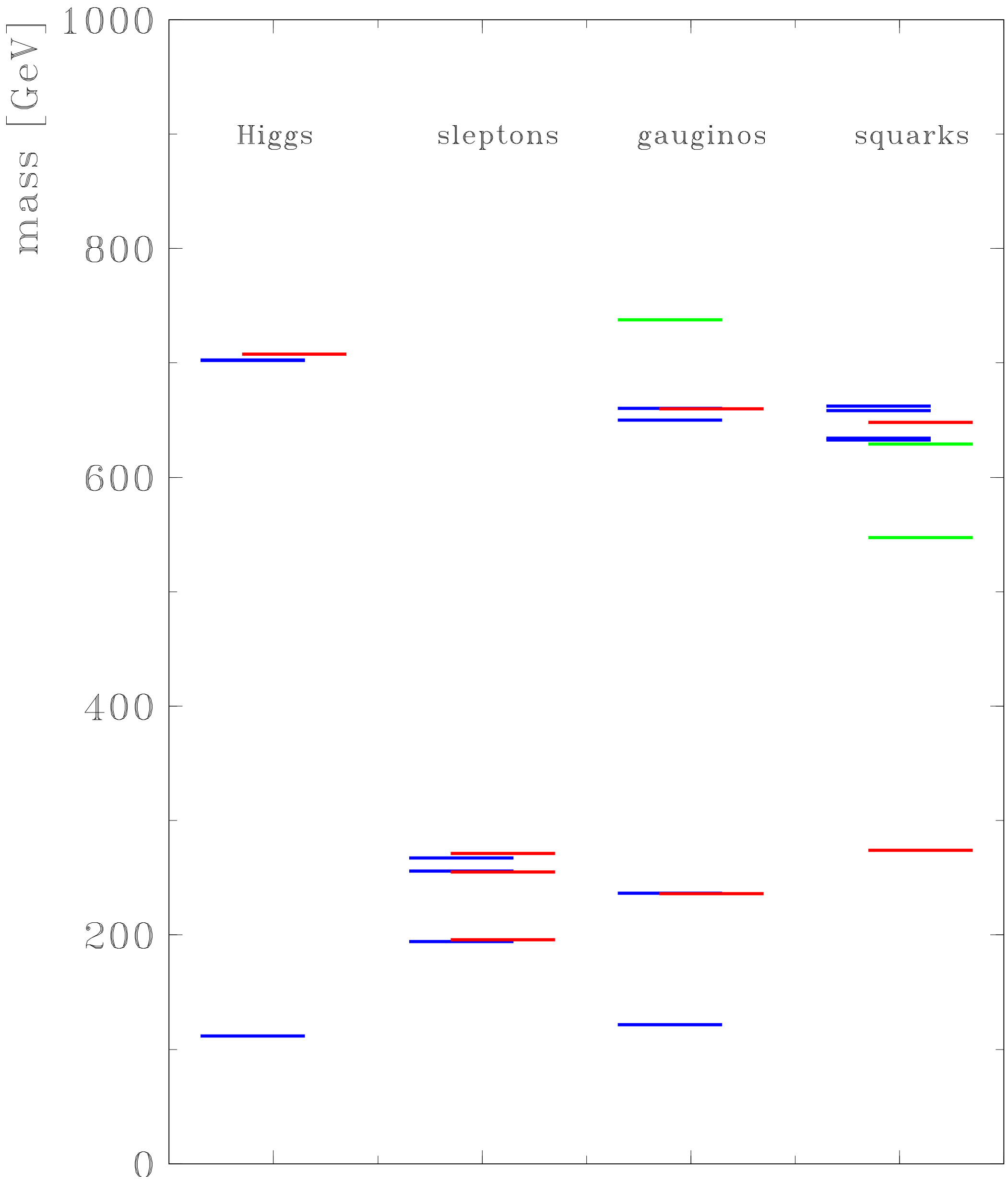

Figure 3: SPS 5 mass spectrum of PYTHIA

PYTHIA parameters

```
SUGRA input parameters
----------------------
m_0          RMSS( 8) =   150.0
m_1/2        RMSS( 1) =   300.0
A_0          RMSS(16) =  -1000.
tan_beta     RMSS( 5) =   5.000
sign mu      RMSS( 4) =   1.000

sparticle masses & widths
-------------------------
M_se_R   194.4 ( 0.366)   M_se_L   267.1 ( 0.349)   M_sne_L  255.7 ( 0.281)
M_sm_R   194.4 ( 0.366)   M_sm_L   267.1 ( 0.349)   M_snm_L  255.7 ( 0.281)
M_st_1   195.9 ( 0.373)   M_st_2   271.3 ( 0.399)   M_snt_L  255.1 ( 0.276)

M_ch0_1  121.4 ( 0.000)   M_ch0_2  236.5 ( 0.004)   M_ch0_3  649.9 (12.037)
M_ch0_4  660.1 (24.943)
M_ch+_1  236.2 ( 0.005)   M_ch+_2  660.0 (15.581)

M_h0     111.9 ( 0.004)   M_H0     702.4 ( 1.405)   M_A0     702.0 ( 1.610)
M_H+     707.6 ( 1.624)

M_g~     737.6 (19.386)
M_uL     658.1 ( 6.389)   M_uR     634.3 ( 1.344)   M_dL     662.1 ( 6.306)
M_dR     632.5 ( 0.335)
M_b1     547.2 (14.603)   M_b2     629.3 ( 0.466)   M_t1     274.0 ( 0.068)
M_t2     647.9 (15.171)

parameter settings IMSS, RMSS
-----------------------------
IMSS( 1) = 2   IMSS( 4) = 1   IMSS( 7) = 0   IMSS(10) = 0
IMSS( 2) = 0   IMSS( 5) = 0   IMSS( 8) = 0   IMSS(11) = 0
IMSS( 3) = 0   IMSS( 6) = 0   IMSS( 9) = 0   IMSS(12) = 0

RMSS( 1) =   300.0       RMSS( 9) =   700.0       RMSS(17) =   1000.
RMSS( 2) =   244.9       RMSS(10) =   544.6       RMSS(18) = -0.2049
RMSS( 3) =   706.3       RMSS(11) =   628.4       RMSS(19) =   703.5
RMSS( 4) =   646.9       RMSS(12) =   384.8       RMSS(20) =  0.4100E-01
RMSS( 5) =   5.000       RMSS(13) =   266.5       RMSS(21) =   1.000
RMSS( 6) =   267.1       RMSS(14) =   192.7       RMSS(22) =   800.0
RMSS( 7) =   194.4       RMSS(15) =   1000.       RMSS(23) =  0.1000E+05
RMSS( 8) =   150.0       RMSS(16) =  -819.2       RMSS(24) =  0.1000E+05
```

5.4 Decay modes

particle	m_I	m_S	m_P	decay	$\mathcal{B}_I$	$\mathcal{B}_S$	$\mathcal{B}_P$
$\tilde{e}_R^-$	191.4	193.5	194.4	$\tilde{\chi}_1^0 e^-$	1.000	1.000	1.000
$\tilde{e}_L^-$	256.3	259.3	267.1	$\tilde{\chi}_1^0 e^-$	0.536	0.448	0.552
				$\tilde{\chi}_2^0 e^-$	0.161	0.191	0.154
				$\tilde{\chi}_1^- \nu_e$	0.303	0.361	0.294
$\tilde{\nu}_e$	244.5	247.7	255.7	$\tilde{\chi}_1^0 \nu_e$	0.764	0.651	0.762
				$\tilde{\chi}_2^0 \nu_e$	0.075	0.110	0.075
				$\tilde{\chi}_1^+ e^-$	0.161	0.239	0.163
$\tilde{\mu}_R^-$	191.4	193.5	194.4	$\tilde{\chi}_1^0 \mu^-$	1.000	1.000	1.000
$\tilde{\mu}_L^-$	256.3	259.3	267.1	$\tilde{\chi}_1^0 \mu^-$	0.536	0.448	0.552
				$\tilde{\chi}_2^0 \mu^-$	0.161	0.191	0.154
				$\tilde{\chi}_1^- \nu_\mu$	0.303	0.361	0.294
$\tilde{\nu}_\mu$	244.5	247.7	255.7	$\tilde{\chi}_1^0 \nu_\mu$	0.764	0.651	0.762
				$\tilde{\chi}_2^0 \nu_\mu$	0.075	0.110	0.075
				$\tilde{\chi}_1^+ \mu^-$	0.161	0.239	0.163
$\tilde{\tau}_1^-$	180.7	182.7	195.9	$\tilde{\chi}_1^0 \tau^-$	1.000	1.000	1.000
$\tilde{\tau}_2^-$	257.9	260.5	271.3	$\tilde{\chi}_1^0 \tau^-$	0.573	0.490	0.517
				$\tilde{\chi}_2^0 \tau^-$	0.148	0.176	0.166
				$\tilde{\chi}_1^- \nu_\tau$	0.279	0.334	0.317
$\tilde{\nu}_\tau$	242.3	245.4	255.1	$\tilde{\chi}_1^0 \nu_\tau$	0.801	0.686	0.773
				$\tilde{\chi}_2^0 \nu_\tau$	0.064	0.099	0.072
				$\tilde{\chi}_1^+ \tau^-$	0.134	0.215	0.155

Table 1: Slepton masses (GeV) and significant branching ratios (> 3%) from Isajet (I), Susygen (S) and Pythia (P)

particle	m_I	m_S	m_P	decay	$\mathcal{B}_I$	$\mathcal{B}_S$	$\mathcal{B}_P$
$\tilde{\chi}_1^0$	119.5	121.2	121.4		1.000	1.000	1.000
$\tilde{\chi}_2^0$	226.3	223.1	236.5	$\tilde{\tau}_1^-\tau^+$	0.466	0.465	0.224
				$\tilde{\tau}_1^+\tau^-$	0.466	0.465	0.224
				$\tilde{\chi}_1^0 h^0$			0.416
$\tilde{\chi}_3^0$	642.8	628.5	649.9	$\tilde{\chi}_1^+W^-$	0.125	0.079	0.139
				$\tilde{\chi}_1^-W^+$	0.125	0.079	0.139
				$\tilde{\chi}_1^0 Z^0$	0.033		0.036
				$\tilde{\chi}_2^0 Z^0$	0.106	0.062	0.118
				$\tilde{t}_1\bar{t}$	0.294	0.373	0.270
				$\bar{\tilde{t}}_1 t$	0.294	0.373	0.270
$\tilde{\chi}_4^0$	652.9	639.0	660.1	$\tilde{\chi}_1^+W^-$	0.064	0.089	0.068
				$\tilde{\chi}_1^-W^+$	0.064	0.089	0.068
				$\tilde{\chi}_2^0 h^0$	0.049	0.064	0.054
				$\tilde{t}_1\bar{t}$	0.391	0.352	0.383
				$\bar{\tilde{t}}_1 t$	0.391	0.352	0.383

Table 2: Neutralino masses (GeV) and significant branching ratios ($> 3\%$) from Isajet (I), Susygen (S) and Pythia (P)

particle	m_I	m_S	m_P	decay	$\mathcal{B}_I$	$\mathcal{B}_S$	$\mathcal{B}_P$
$\tilde{\chi}_1^+$	226.3	223.0	236.2	$\tilde{\chi}_1^0 W^+$	0.205	0.369	0.667
				$\tilde{t}_1\bar{b}$	0.163	0.548	
				$\tilde{\tau}_1^+\nu_\tau$	0.622	0.080	0.333
$\tilde{\chi}_2^+$	652.7	638.8	660.0	$\tilde{\chi}_2^0 W^+$	0.109	0.112	0.117
				$\tilde{t}_1\bar{b}$	0.647	0.723	0.623
				$\tilde{\chi}_1^+ Z^0$	0.103	0.115	0.109
				$\tilde{\chi}_1^+ h^0$	0.093		0.099

Table 3: Chargino masses (GeV) and significant branching ratios ($> 3\%$) from Isajet (I), Susygen (S) and Pythia (P)

particle	m_I	m_S	m_P	decay	$\mathcal{B}_I$	$\mathcal{B}_S$	$\mathcal{B}_P$
h^0	119.8	113.9	111.9	$\tau^-\tau^+$	0.048	0.080	0.066
				$b\bar{b}$	0.798	0.790	0.796
				$c\bar{c}$	0.036		0.047
				gg		0.034	0.037
				W^+W^-		0.060	0.045
H^0	694.0	679.2	702.4	$b\bar{b}$	0.058	0.030	0.237
				$t\bar{t}$	0.162	0.139	0.708
				$\tilde{t}_1\bar{\tilde{t}}_1$	0.735	0.790	
A^0	693.9	680.0	702.0	$b\bar{b}$	0.065	0.121	0.208
				$t\bar{t}$	0.214	0.641	0.764
				$\tilde{t}_1\bar{\tilde{t}}_1$	0.661		
				$\tilde{\chi}_1^+\tilde{\chi}_1^-$		0.111	
H^+	698.5	684.5	707.6	tb	0.885	0.891	0.973
				$\tilde{\chi}_1^+\tilde{\chi}_1^0$	0.051	0.058	
				$\tilde{\tau}_1^+\tilde{\nu}_\tau$	0.036		

Table 4: Higgs masses (GeV) and significant branching ratios (> 3%) from Isajet (I), Susygen (S) and Pythia (P)

particle	m_I	m_S	m_P	decay	$\mathcal{B}_I$	$\mathcal{B}_S$	$\mathcal{B}_P$
$\tilde{t}_1$	220.7	210.0	274.0	$\tilde{\chi}_1^0c$	1.000	1.000	
				$\tilde{\chi}_1^+b$			1.000
$\tilde{t}_2$	644.6	631.6	647.9	$\tilde{\chi}_1^+b$	0.125	0.704	0.155
				$Z^0\tilde{t}_1$	0.612		0.611
				$h^0\tilde{t}_1$	0.139		0.112
				$W^+\tilde{b}_1$	0.060		0.043
				$\tilde{\chi}_1^0t$		0.061	
				$\tilde{\chi}_2^0t$	0.048	0.235	0.060
$\tilde{b}_1$	535.9	560.8	547.2	$\tilde{\chi}_2^0b$	0.080	0.389	0.101
				$\tilde{\chi}_1^-t$	0.101	0.584	0.129
				$W^-\tilde{t}_1$	0.813		0.764
$\tilde{b}_2$	623.0	654.5	629.3	$\tilde{\chi}_1^0b$	0.285	0.894	0.711
				$\tilde{\chi}_2^0b$		0.041	
				$\tilde{\chi}_1^-t$	0.042	0.062	
				$W^-\tilde{t}_1$	0.644		0.238

Table 5: Light squark masses (GeV) and significant branching ratios (> 3%) from Isajet (I), Susygen (S) and Pythia (P)

6 SPS 6 – MSSM scenario

m_0	150 GeV
$m_{1/2}$	300 GeV
A_0	0 GeV
$\tan\beta$	10
sign μ	$+$

'non-unified gaugino masses'

$M_1 = 480$ GeV, $M_2 = M_3 = 300$ GeV

$m_0 = 0.5\, M_2$

6.1 Spectrum & parameters of ISAJET 7.58

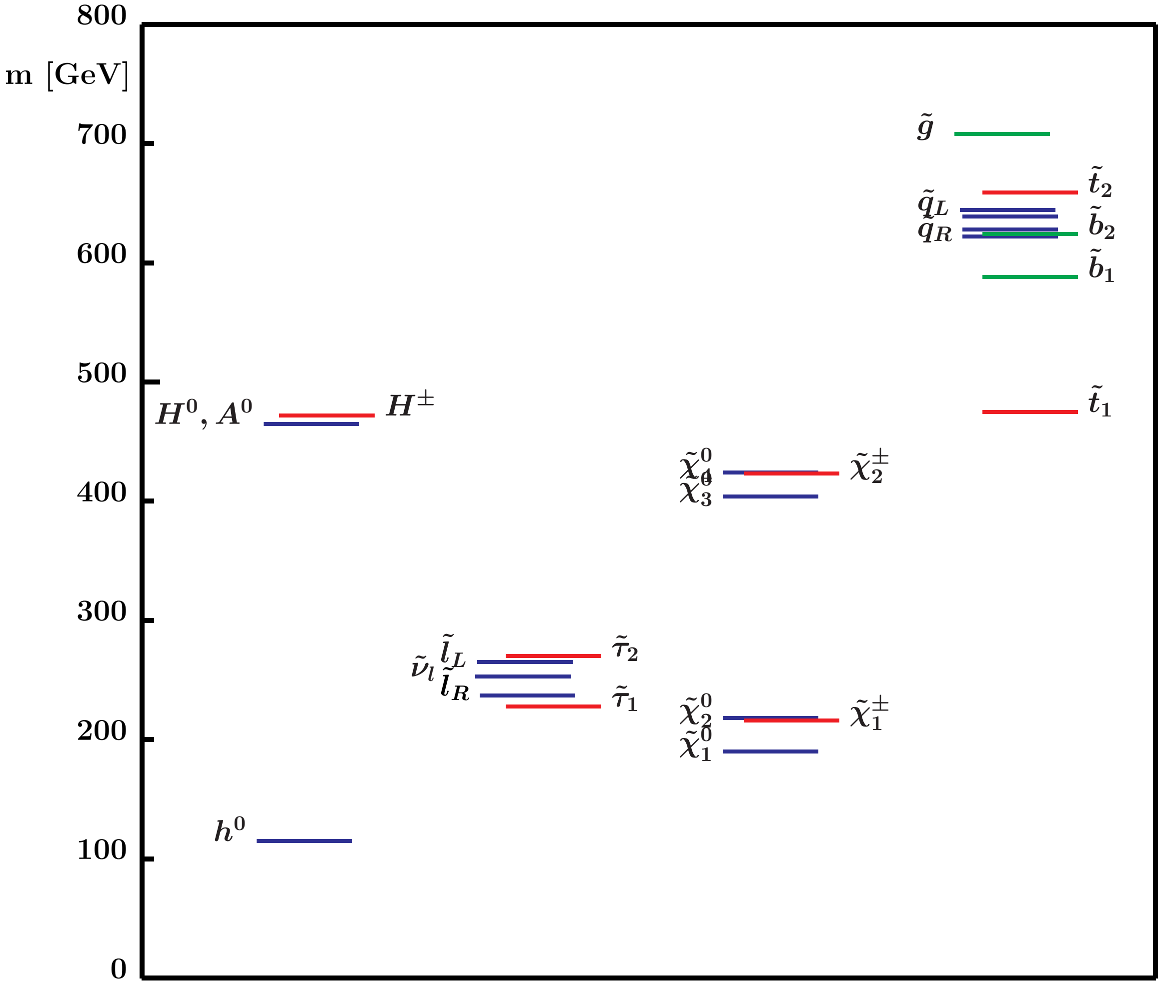

Figure 1: SPS 6 mass spectrum of ISAJET

Isajet parameters

```
Minimal supergravity (mSUGRA) model:

M_0,  M_(1/2),  A_0,  tan(beta),  sgn(mu),  M_t =
  150.000   300.000     0.000    10.000     1.0   175.000

M_1(GUT)=   480.00    M_2(GUT)=   300.00    M_3(GUT)=   300.00

ISASUGRA unification:
M_GUT      = 0.190E+17   g_GUT          =0.713      alpha_GUT =0.040
FT_GUT     = 0.478       FB_GUT         = 0.047     FL_GUT = 0.069

1/alpha_em =  127.65     sin**2(thetaw) =0.2308     alpha_s   =0.119
M_1        =  195.89     M_2            =  232.06   M_3       =  691.24
mu(Q)      =  393.89     B(Q)           =   54.73   Q         =  548.25
M_H1^2     = 0.612E+05   M_H2^2         =-0.151E+06

ISAJET masses (with signs):
M(GL)  =   708.45
M(UL)  =   639.13   M(UR)  =   628.29   M(DL)  =   644.01   M(DR) =   622.27
M(B1)  =   588.93   M(B2)  =   624.45   M(T1)  =   476.16   M(T2) =   660.67
M(SN)  =   252.77   M(EL)  =   264.88   M(ER)  =   236.76
M(NTAU)=   251.75   M(TAU1)=   227.92   M(TAU2)=   269.64
M(Z1)  =  -189.37   M(Z2)  =  -217.91   M(Z3)  =   399.31   M(Z4) =  -419.98
M(W1)  =  -215.34   M(W2)  =  -418.91
M(HL)  =   114.83   M(HH)  =   463.62   M(HA)  =   463.04   M(H+) =   470.11

theta_t=   0.9831   theta_b=   0.3882   theta_l=   1.1799   alpha_h=   0.1079

NEUTRALINO MASSES (SIGNED) =  -189.375  -217.905   399.307  -419.978
EIGENVECTOR 1       =  -0.11796   0.21288   0.25953  -0.93456
EIGENVECTOR 2       =   0.13928  -0.22503  -0.90923  -0.32133
EIGENVECTOR 3       =  -0.70987  -0.69812   0.08065  -0.04702
EIGENVECTOR 4       =  -0.68027   0.64550  -0.31533   0.14534

CHARGINO MASSES (SIGNED)  =  -215.342  -418.910
GAMMAL, GAMMAR             =   1.97743   1.81705


ISAJET equivalent input:
MSSMA:   708.45  393.89  463.04   10.00
MSSMB:   641.33  621.76  629.29  260.71  232.75
MSSMC:   591.24  618.96  516.96  259.71  230.48 -569.95 -811.30 -213.39
MSSMD: SAME AS MSSMB (DEFAULT)
MSSME:   195.89  232.06
```

6.2 Spectrum & parameters of SUSYGEN 3.00/25

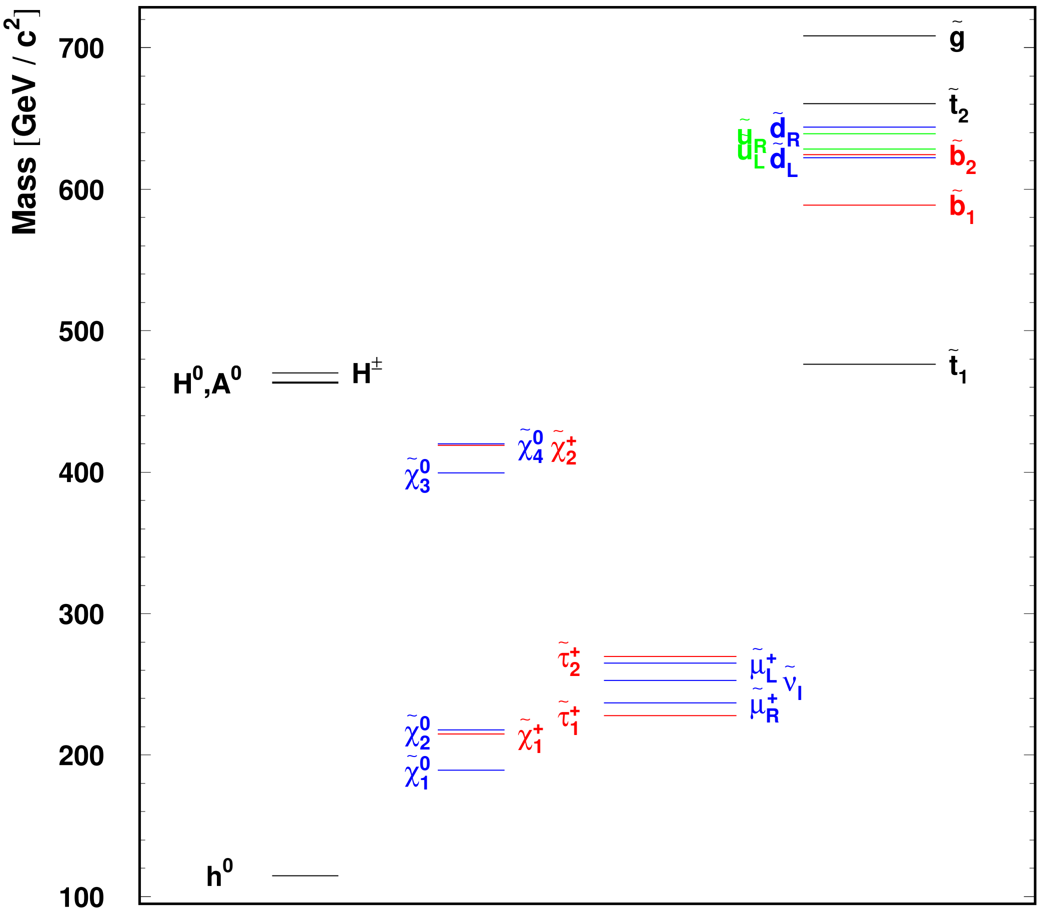

Figure 2: SPS 6 mass spectrum of SUSYGEN

SUSYGEN parameters

```
Susygen inputs:
--------------

m0      =   150.000   TANB     =    10.000
m1/2    =   300.000    mu/|mu| =     1
A0      =     0.000

Sparticle masses:
----------------

SUPR      639.  SUPL       628.
SDNR      644.  SDNL       622.
SELR      237.  SELL       265.
SNU       253.
STP1      476.  STP2       661. cosmix =  0.554
SBT1      589.  SBT2       624. cosmix =  0.926
STA1      228.  STA2       270. cosmix=   0.381
SGLU      708.


Gaugino masses:
--------------

M1 =    195.890 M2 =    232.060 M3 =    691.240

NEUTRALINO m, CP, ph/zi/ha/hb 1 =  189.3  1. -0.693  0.678 -0.139 -0.201
NEUTRALINO m, CP, ph/zi/ha/hb 2 =  217.8  1.  0.720  0.641 -0.161 -0.210
NEUTRALINO m, CP, ph/zi/ha/hb 3 =  399.3 -1. -0.002  0.094 -0.637  0.765
NEUTRALINO m, CP, ph/zi/ha/hb 4 =  420.1  1. -0.025 -0.347 -0.741 -0.574

CHARGINO MASSES    =   215.088   419.050
CHARGINO ETA       =    -1.000     1.000

U matrix      WINO      HIGGSINO   V matrix      WINO      HIGGSINO
W1SS+        -0.918     0.396      W1SS-         0.970    -0.244
W2SS+         0.396     0.918      W2SS-         0.244     0.970

Higgses masses:
--------------

Light CP-even Higgs =   114.830
Heavy CP-even Higgs =   463.620
      CP-odd  Higgs =   463.040
      Charged Higgs =   470.110
      sin(a-b)      =     0.108
      cos(a-b)      =     0.994
```

6.3 Spectrum & parameters of PYTHIA 6.2/00

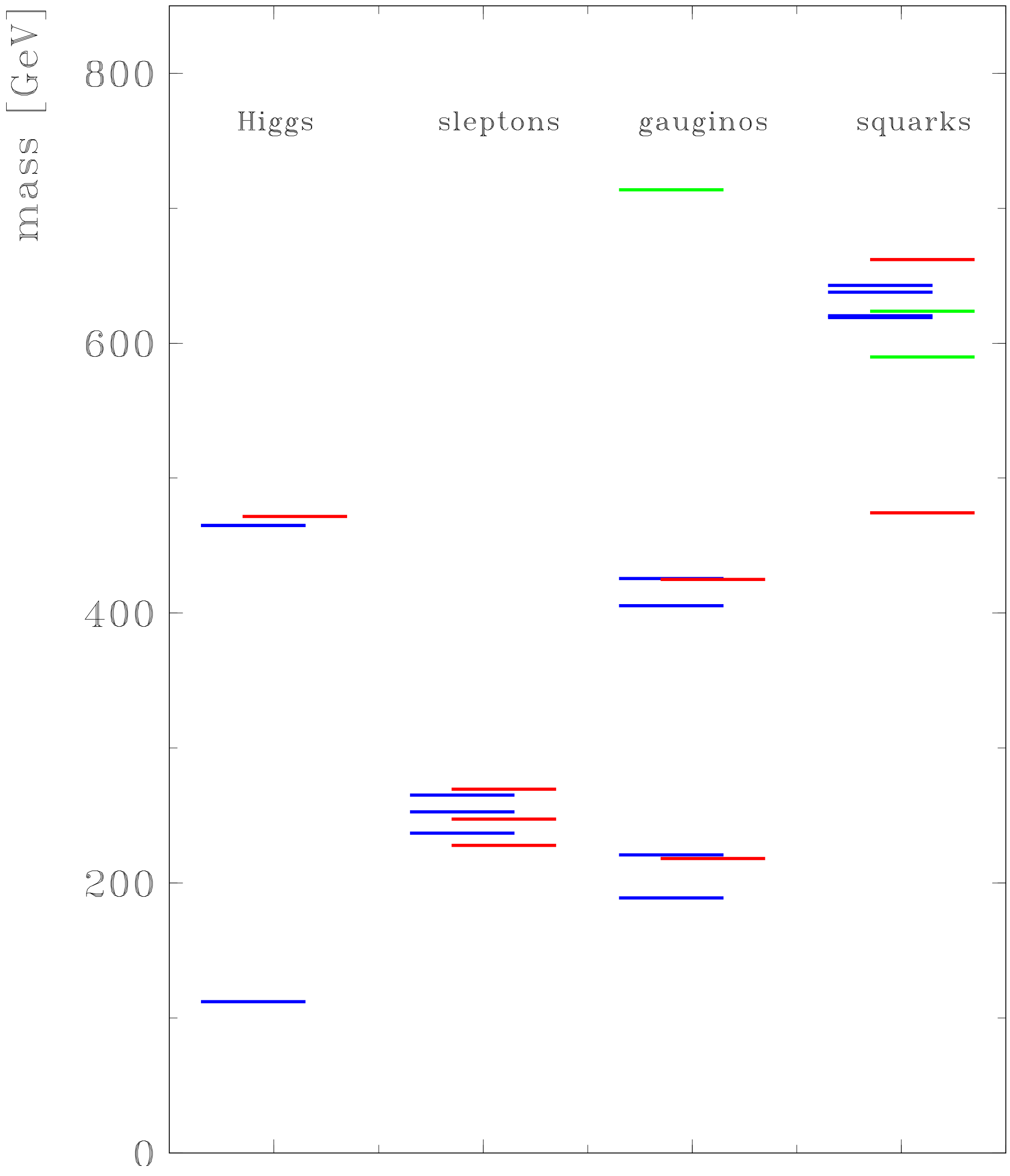

Figure 3: SPS 6 mass spectrum of PYTHIA

Pythia parameters

```
 MSSM input parameters
 ---------------------
   M_1         RMSS( 1) =   195.0
   M_2         RMSS( 2) =   235.0
   M_3         RMSS( 3) =   680.0
   tan_beta    RMSS( 5) =   10.00
   mu          RMSS( 4) =   400.0

   sparticle masses & widths
   -------------------------
   M_se_R   237.0 ( 0.146)   M_se_L   265.0 ( 0.343)   M_sne_L  252.7 ( 0.281)
   M_sm_R   237.0 ( 0.146)   M_sm_L   265.0 ( 0.343)   M_snm_L  252.7 ( 0.281)
   M_st_1   227.8 ( 0.095)   M_st_2   269.6 ( 0.369)   M_snt_L  247.5 ( 0.224)

   M_ch0_1  189.1 ( 0.000)   M_ch0_2  220.7 ( 0.000)   M_ch0_3  405.3 ( 2.256)
   M_ch0_4  425.6 ( 2.918)
   M_ch+_1  218.2 ( 0.000)   M_ch+_2  424.9 ( 2.828)

   M_h0     112.2 ( 0.004)   M_H0     465.0 ( 1.051)   M_A0     464.8 ( 1.124)
   M_H+     471.5 ( 1.022)

   M_g~     713.5 (10.510)
   M_uL     637.8 ( 6.177)   M_uR     619.0 ( 1.145)   M_dL     642.7 ( 5.991)
   M_dR     620.5 ( 0.287)
   M_b1     589.7 ( 4.359)   M_b2     623.6 ( 1.080)   M_t1     474.3 ( 2.734)
   M_t2     662.0 ( 9.357)

   parameter settings IMSS, RMSS
   -----------------------------
   IMSS( 1) = 1   IMSS( 4) = 1   IMSS( 7) = 0   IMSS(10) = 0
   IMSS( 2) = 0   IMSS( 5) = 0   IMSS( 8) = 0   IMSS(11) = 0
   IMSS( 3) = 0   IMSS( 6) = 0   IMSS( 9) = 0   IMSS(12) = 0

   RMSS( 1) =   195.0       RMSS( 9) =   620.0       RMSS(17) =   0.000
   RMSS( 2) =   235.0       RMSS(10) =   590.0       RMSS(18) = -0.1078
   RMSS( 3) =   680.0       RMSS(11) =   620.0       RMSS(19) =   465.0
   RMSS( 4) =   400.0       RMSS(12) =   515.0       RMSS(20) =  0.4100E-01
   RMSS( 5) =   10.00       RMSS(13) =   260.0       RMSS(21) =   1.000
   RMSS( 6) =   265.0       RMSS(14) =   230.0       RMSS(22) =   620.0
   RMSS( 7) =   237.0       RMSS(15) =   0.000       RMSS(23) =  0.1000E+05
   RMSS( 8) =   640.0       RMSS(16) =  -560.0       RMSS(24) =  0.1000E+05
```

6.4 Branching ratios

particle	m_I	m_S	m_P	decay	$\mathcal{B}_I$	$\mathcal{B}_S$	$\mathcal{B}_P$
$\tilde{e}_R^-$	236.8	236.8	237.0	$\tilde{\chi}_1^0 e^-$	0.979	0.979	0.988
$\tilde{e}_L^-$	264.9	264.9	265.0	$\tilde{\chi}_1^0 e^-$	0.046	0.045	0.070
				$\tilde{\chi}_2^0 e^-$	0.370	0.370	0.355
				$\tilde{\chi}_1^- \nu_e$	0.583	0.585	0.575
$\tilde{\nu}_e$	252.8	252.8	252.7	$\tilde{\chi}_1^0 \nu_e$	0.394	0.392	0.409
				$\tilde{\chi}_2^0 \nu_e$	0.121	0.121	0.126
				$\tilde{\chi}_1^+ e^-$	0.485	0.487	0.465
$\tilde{\mu}_R^-$	236.8	236.8	237.0	$\tilde{\chi}_1^0 \mu^-$	0.979	0.979	0.988
$\tilde{\mu}_L^-$	264.9	264.9	265.0	$\tilde{\chi}_1^0 \mu^-$	0.046	0.045	0.070
				$\tilde{\chi}_2^0 \mu^-$	0.370	0.370	0.355
				$\tilde{\chi}_1^- \nu_\mu$	0.583	0.585	0.575
$\tilde{\nu}_\mu$	252.8	252.8	252.7	$\tilde{\chi}_1^0 \nu_\mu$	0.394	0.392	0.409
				$\tilde{\chi}_2^0 \nu_\mu$	0.121	0.121	0.126
				$\tilde{\chi}_1^+ \mu^-$	0.485	0.487	0.465
$\tilde{\tau}_1^-$	227.9	227.9	227.8	$\tilde{\chi}_1^0 \tau^-$	0.933	0.932	0.966
				$\tilde{\chi}_1^- \nu_\tau$	0.040	0.041	
$\tilde{\tau}_2^-$	269.6	269.6	269.6	$\tilde{\chi}_1^0 \tau^-$	0.135	0.133	0.159
				$\tilde{\chi}_2^0 \tau^-$	0.346	0.346	0.329
				$\tilde{\chi}_1^- \nu_\tau$	0.519	0.521	0.511
$\tilde{\nu}_\tau$	251.7	251.8	247.5	$\tilde{\chi}_1^0 \nu_\tau$	0.400	0.398	0.450
				$\tilde{\chi}_2^0 \nu_\tau$	0.120	0.119	0.115
				$\tilde{\chi}_1^+ \tau^-$	0.480	0.483	0.435

Table 1: Slepton masses (GeV) and significant branching ratios (> 3%) from Isajet (I), Susygen (S) and Pythia (P)

particle	m_I	m_S	m_P	decay	$\mathcal{B}_I$	$\mathcal{B}_S$	$\mathcal{B}_P$
$\tilde{\chi}_1^0$	189.4	189.3	189.1		1.000	1.000	1.000
$\tilde{\chi}_2^0$	217.9	217.8	220.7	$\tilde{\chi}_1^0 e^- e^+$	0.131	0.169	0.123
				$\tilde{\chi}_1^0 \mu^- \mu^+$	0.131	0.169	0.123
				$\tilde{\chi}_1^0 \tau^- \tau^+$	0.375	0.195	0.272
				$\tilde{\chi}_1^0 \nu_e \bar{\nu}_e$	0.093	0.119	0.116
				$\tilde{\chi}_1^0 \nu_\mu \bar{\nu}_\mu$	0.093	0.119	0.116
				$\tilde{\chi}_1^0 \nu_\tau \bar{\nu}_\tau$	0.099	0.127	0.160
$\tilde{\chi}_3^0$	399.3	399.3	405.3	$\tilde{\chi}_1^+ W^-$	0.305	0.350	0.305
				$\tilde{\chi}_1^- W^+$	0.305	0.350	0.305
				$\tilde{\chi}_1^0 Z^0$	0.192	0.144	0.176
				$\tilde{\chi}_2^0 Z^0$	0.152	0.114	0.165
$\tilde{\chi}_4^0$	420.0	420.1	425.6	$\tilde{\chi}_1^+ W^-$	0.279	0.337	0.276
				$\tilde{\chi}_1^- W^+$	0.279	0.337	0.276
				$\tilde{\chi}_1^0 h^0$	0.121	0.072	0.111
				$\tilde{\chi}_2^0 h^0$	0.099	0.059	0.114

Table 2: Neutralino masses (GeV) and significant branching ratios (> 3%) from Isajet (I), Susygen (S) and Pythia (P)

particle	m_I	m_S	m_P	decay	$\mathcal{B}_I$	$\mathcal{B}_S$	$\mathcal{B}_P$
$\tilde{\chi}_1^+$	215.3	215.1	218.2	$\tilde{\chi}_1^0 u \bar{d}$	0.295	0.303	0.292
				$\tilde{\chi}_1^0 c \bar{s}$	0.295	0.296	0.292
				$\tilde{\chi}_1^0 e^+ \nu_e$	0.133	0.137	0.136
				$\tilde{\chi}_1^0 \mu^+ \nu_\mu$	0.133	0.137	0.136
				$\tilde{\chi}_1^0 \tau^+ \nu_\tau$	0.144	0.128	0.146
$\tilde{\chi}_2^+$	418.9	419.0	424.9	$\tilde{\chi}_2^0 W^+$	0.363	0.376	0.356
				$\tilde{e}_L^+ \nu_e$	0.038	0.040	0.038
				$\tilde{\mu}_L^+ \nu_\mu$	0.038	0.040	0.038
				$\tilde{\tau}_2^+ \nu_\tau$	0.041	0.037	0.042
				$\tilde{\chi}_1^+ Z^0$	0.265	0.433	0.263
				$\tilde{\chi}_1^+ h^0$	0.185		0.188

Table 3: Chargino masses (GeV) and significant branching ratios (> 3%) from Isajet (I), Susygen (S) and Pythia (P)

particle	m_I	m_S	m_P	decay	$\mathcal{B}_I$	$\mathcal{B}_S$	$\mathcal{B}_P$
h^0	114.8	114.8	112.2	$\tau^-\tau^+$	0.050	0.069	0.067
				$b\bar{b}$	0.837	0.799	0.802
				$c\bar{c}$	0.036		0.044
				gg		0.060	0.034
				W^+W^-		0.047	0.043
H^0	463.6	463.6	464.9	$\tau^-\tau^+$	0.060	0.066	0.092
				$b\bar{b}$	0.817	0.560	0.818
				$t\bar{t}$	0.074	0.111	0.078
				$\tilde{\chi}_1^+\tilde{\chi}_1^-$		0.090	
				$\tilde{\chi}_1^0\tilde{\chi}_3^0$		0.064	
				$\tilde{\chi}_2^0\tilde{\chi}_2^0$		0.036	
A^0	463.0	463.0	464.8	$\tau^-\tau^+$	0.051	0.062	0.086
				$b\bar{b}$	0.693	0.529	0.767
				$t\bar{t}$	0.118	0.141	0.144
				$\tilde{\chi}_1^0\tilde{\chi}_1^0$	0.036		
				$\tilde{\chi}_1^0\tilde{\chi}_2^0$	0.060		
				$\tilde{\chi}_1^+\tilde{\chi}_1^-$		0.263	
H^+	470.1	470.1	471.5	$\nu_\tau\tau^+$	0.076	0.077	0.096
				$t\bar{b}$	0.839	0.746	0.902
				$\tilde{\chi}_1^+\tilde{\chi}_1^0$	0.074	0.138	
				$\tilde{\chi}_2^+\tilde{\chi}_1^0$		0.032	

Table 4: Higgs masses (GeV) and significant branching ratios (> 3%) from Isajet (I), Susygen (S) and Pythia (P)

particle	m_I	m_S	m_P	decay	$\mathcal{B}_I$	$\mathcal{B}_S$	$\mathcal{B}_P$
$\tilde{t}_1$	476.2	476.2	474.3	$\tilde{\chi}_1^0 t$	0.134	0.115	0.140
				$\tilde{\chi}_2^0 t$	0.166	0.143	0.163
				$\tilde{\chi}_1^+ b$	0.624	0.639	0.635
				$\tilde{\chi}_2^+ b$	0.075	0.103	0.062
$\tilde{t}_2$	660.7	660.7	662.0	$\tilde{\chi}_1^+ b$	0.182	0.200	0.180
				$\tilde{\chi}_2^+ b$	0.210	0.359	0.203
				$Z^0 \tilde{t}_1$	0.155		0.169
				$h^0 \tilde{t}_1$	0.036		
				$\tilde{\chi}_2^0 t$	0.088	0.060	0.089
				$\tilde{\chi}_3^0 t$	0.072	0.181	0.076
				$\tilde{\chi}_4^0 t$	0.249	0.196	0.247
$\tilde{b}_1$	588.9	588.9	589.7	$\tilde{\chi}_1^0 b$	0.102	0.113	0.072
				$\tilde{\chi}_2^0 b$	0.281	0.282	0.293
				$\tilde{\chi}_1^- t$	0.479	0.559	0.481
				$W^- \tilde{t}_1$	0.115		0.140
$\tilde{b}_2$	624.5	624.5	623.6	$\tilde{\chi}_1^0 b$	0.121	0.133	0.253
				$\tilde{\chi}_2^0 b$	0.099	0.108	0.152
				$\tilde{\chi}_3^0 b$	0.056	0.179	
				$\tilde{\chi}_4^0 b$	0.078	0.201	
				$\tilde{\chi}_1^- t$	0.127	0.111	0.235
				$\tilde{\chi}_2^- t$	0.325	0.268	0.159
				$W^- \tilde{t}_1$	0.193		0.191

Table 5: Light squark masses (GeV) and significant branching ratios ($> 3\%$) from Isajet (I), Susygen (S) and Pythia (P)

7 SPS 7 – GMSB scenario

Λ	40 TeV
M_{mess}	80 TeV
N_{mess}	3
$\tan\beta$	15
sign μ	$+$

NLSP $= \tilde{\tau}$

$M_{mess} = 2\,\Lambda$

7.1 Spectrum & parameters of ISAJET 7.58

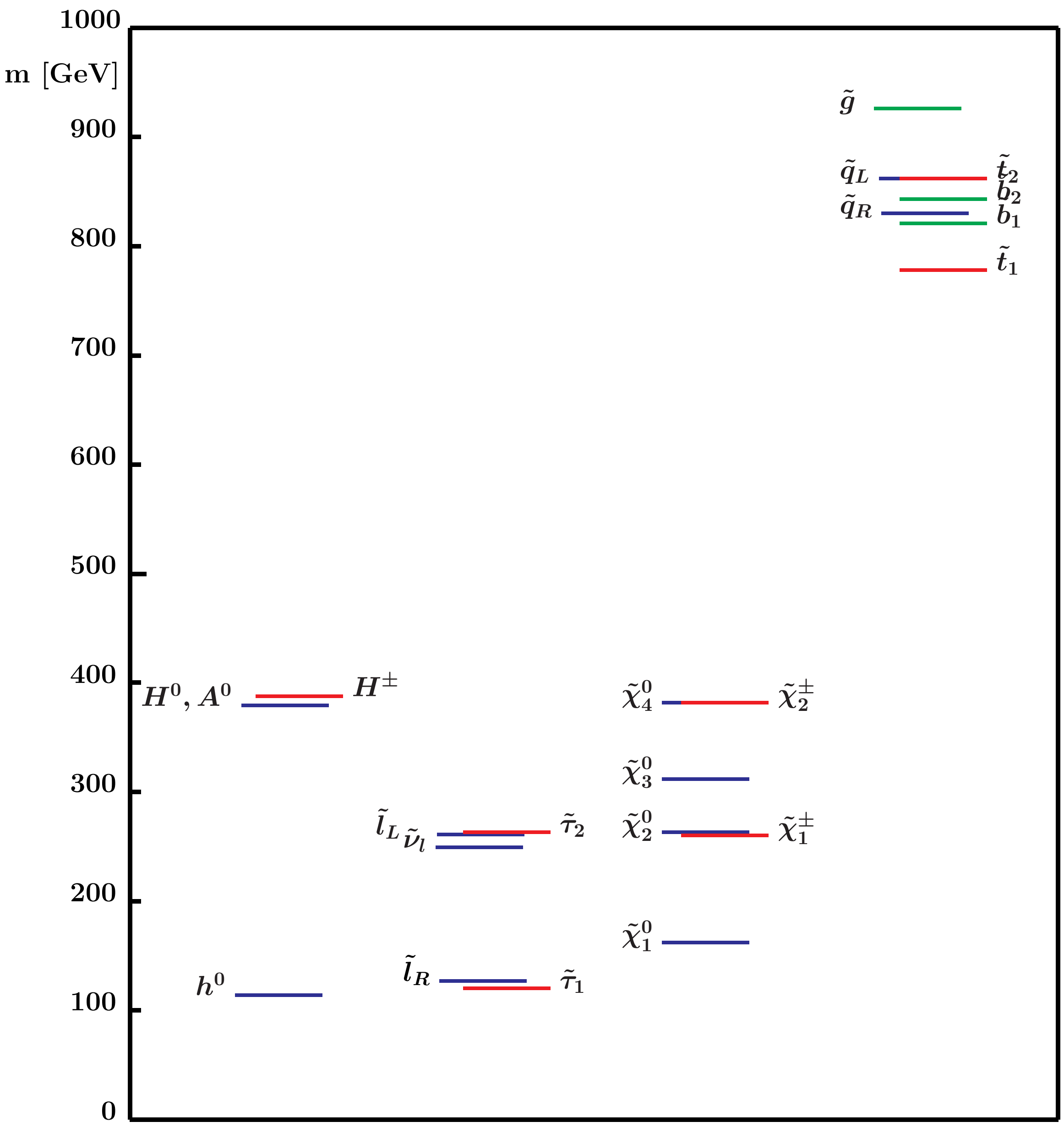

Figure 1: SPS 7 mass spectrum of ISAJET

ISAJET parameters

```
Minimal gauge mediated (GMSB) model:

Lambda,  M_mes,  N_5,  tan(beta),  sgn(mu),  M_t,  C_grav=
0.400E+05 0.800E+05     3.000    15.000     1.0   175.000  0.100E+01

GMSB2 model input:
Rsl,    dmH_d^2,   dmH_u^2,     d_Y,     N5_1,  N5_2,  N5_3=
 1.000  0.000E+00  0.000E+00  0.000E+00    3.000  3.000  3.000

M(gravitino)= 0.770E-09

1/alpha_em =  127.86     sin**2(thetaw) =0.2311     alpha_s   =0.118
M_1        =  168.59     M_2            =  326.81   M_3       =  895.45
mu(Q)      =  300.03     B(Q)           =   31.35   Q         =  839.57
M_H1^2     = 0.574E+05   M_H2^2         =-0.746E+05

ISAJET masses (with signs):
M(GL)  =   926.04
M(UL)  =   859.66   M(UR)  =   830.54   M(DL)  =   863.34   M(DR) =   828.93
M(B1)  =   822.17   M(B2)  =   843.35   M(T1)  =   779.09   M(T2) =   863.00
M(SN)  =   249.06   M(EL)  =   261.47   M(ER)  =   127.43
M(NTAU)=   248.62   M(TAU1)=   120.45   M(TAU2)=   263.40
M(Z1)  =  -161.65   M(Z2)  =  -260.06   M(Z3)  =   306.26   M(Z4) =  -379.94
M(W1)  =  -256.33   M(W2)  =  -379.45
M(HL)  =   113.57   M(HH)  =   378.37   M(HA)  =   377.89   M(H+) =   386.70

theta_t=   1.1366   theta_b=   1.0603   theta_l=   1.4237   alpha_h=   0.0765

NEUTRALINO MASSES (SIGNED) =  -161.653  -260.057   306.255  -379.941
EIGENVECTOR 1       =   0.13633  -0.23326  -0.07337   0.96001
EIGENVECTOR 2       =   0.48781  -0.55279  -0.62706  -0.25151
EIGENVECTOR 3       =   0.71148   0.69498  -0.08382   0.06142
EIGENVECTOR 4       =  -0.48709   0.39625  -0.77096   0.10653

CHARGINO MASSES (SIGNED)  =  -256.330  -379.452
GAMMAL, GAMMAR             =   2.54887   2.38244


ISAJET equivalent input:
MSSMA:   926.04  300.03  377.89   15.00
MSSMB:   861.32  828.55  831.31  257.19  119.73
MSSMC:   836.27  826.88  780.14  256.77  117.61 -319.43 -350.48  -38.97
MSSMD: SAME AS MSSMB (DEFAULT)
MSSME:   168.59  326.81
```

7.2 Spectrum & parameters of SUSYGEN 3.00/27

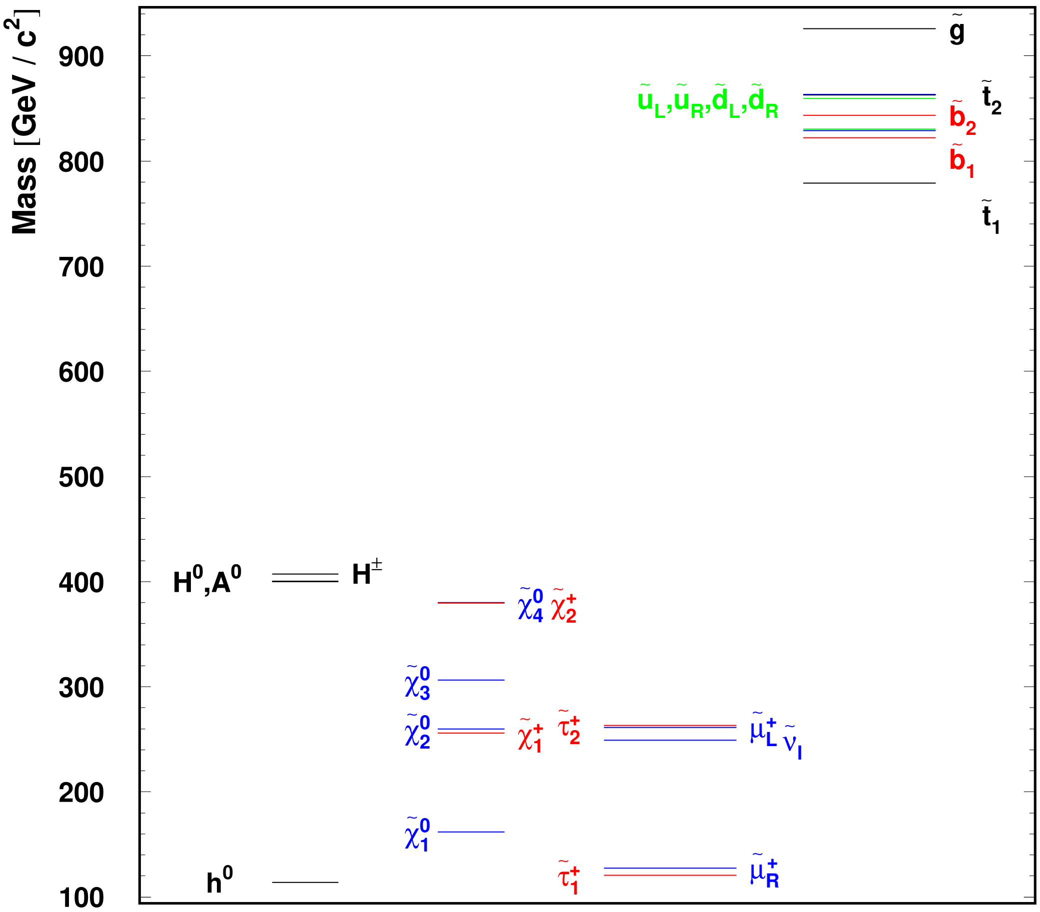

Figure 2: SPS 7 mass spectrum of SUSYGEN

Susygen parameters

```
Susygen inputs:
--------------

M2      =   326.810   mu       =   300.030
M1      =   168.590   M3       =   895.450
XRFSUSY =    56.568   NFAM     =     3
TANB    =    15.000

Sparticle masses: (input from Isajet)
----------------

SUPR      831.  SUPL       860.
SDNR      829.  SDNL       863.
SELR      127.  SELL       261.
SNU       249.
STP1      779.  STP2       863. cosmix =  0.421
SBT1      822.  SBT2       843. cosmix =  0.489
STA1      120.  STA2       263. cosmix=   0.147
SGLU      926.

Gravitino mass: 0.769799202  eV
--------------

Gaugino masses:
--------------

M1 =    168.590 M2 =    326.810 M3 =    895.450

NEUTRALINO m, CP, ph/zi/ha/hb 1 =  161.6  1.  0.806 -0.526  0.152  0.224
NEUTRALINO m, CP, ph/zi/ha/hb 2 =  259.9  1. -0.523 -0.429  0.523  0.519
NEUTRALINO m, CP, ph/zi/ha/hb 3 =  306.3 -1. -0.013  0.103 -0.664  0.741
NEUTRALINO m, CP, ph/zi/ha/hb 4 =  380.1  1. -0.277 -0.727 -0.513 -0.363

CHARGINO MASSES    =   256.014   379.662
CHARGINO ETA       =    -1.000     1.000

U matrix      WINO      HIGGSINO      V matrix      WINO     HIGGSINO
W1SS+       -0.559      0.829         W1SS-         0.689   -0.725
W2SS+        0.829      0.559         W2SS-         0.725    0.689

Higgses masses:
--------------

Light CP-even Higgs =   113.895
Heavy CP-even Higgs =   400.218
      CP-odd  Higgs =   400.000
      Charged Higgs =   407.406
      sin(a-b)      =    -0.076
      cos(a-b)      =     0.997
```

7.3 Decay modes

particle	m_I	m_S	m_P	decay	$\mathcal{B}_I$	$\mathcal{B}_S$	$\mathcal{B}_P$
$\tilde{e}_R^-$	127.4	127.4		$\tilde{\tau}_1^- e^- \tau^+$	0.342		
				$\tilde{\tau}_1^+ e^- \tau^-$	0.591		
				$e^- \tilde{G}$	0.067	1.000	
$\tilde{e}_L^-$	261.5	261.5		$\tilde{\chi}_1^0 e^-$	0.987	0.986	
$\tilde{\nu}_e$	249.1	249.1		$\tilde{\chi}_1^0 \nu_e$	1.000	1.000	
$\tilde{\mu}_R^-$	127.4	127.4		$\tilde{\tau}_1^- \mu^- \tau^+$	0.342		
				$\tilde{\tau}_1^+ \mu^- \tau^-$	0.591		
				$\mu^- \tilde{G}$	0.067	1.000	
$\tilde{\mu}_L^-$	261.5	261.5		$\tilde{\chi}_1^0 \mu^-$	0.987	0.986	
$\tilde{\nu}_\mu$	249.1	249.1		$\tilde{\chi}_1^0 \nu_\mu$	1.000	1.000	
$\tilde{\tau}_1^-$	120.4	120.4		$\tau^- \tilde{G}$	1.000	1.000	
$\tilde{\tau}_2^-$	263.4	263.4		$\tilde{\chi}_1^0 \tau^-$	0.604	0.978	
				$Z^0 \tilde{\tau}_1^-$	0.168		
				$h^0 \tilde{\tau}_1^-$	0.215		
$\tilde{\nu}_\tau$	248.6	248.6		$\tilde{\chi}_1^0 \nu_\tau$	0.746	1.000	
				$W^+ \tilde{\tau}_1^-$	0.254		

Table 1: Slepton masses (GeV) and significant branching ratios (> 3%) from Isajet (I), Susygen (S) and Pythia (P)

particle	m_I	m_S	m_P	decay	$\mathcal{B}_I$	$\mathcal{B}_S$	$\mathcal{B}_P$
$\tilde{\chi}_1^0$	161.7	161.6		$\tilde{e}_R^- e^+$	0.148	0.148	
				$\tilde{e}_R^+ e^-$	0.148	0.148	
				$\tilde{\mu}_R^- \mu^+$	0.148	0.148	
				$\tilde{\mu}_R^+ \mu^-$	0.148	0.148	
				$\tilde{\tau}_1^- \tau^+$	0.203	0.204	
				$\tilde{\tau}_1^+ \tau^-$	0.203	0.204	
$\tilde{\chi}_2^0$	260.1	259.9		$\tilde{e}_R^- e^+$	0.118	0.117	
				$\tilde{e}_R^+ e^-$	0.118	0.117	
				$\tilde{\mu}_R^- \mu^+$	0.118	0.117	
				$\tilde{\mu}_R^+ \mu^-$	0.118	0.117	
				$\tilde{\tau}_1^- \tau^+$	0.237	0.241	
				$\tilde{\tau}_1^+ \tau^-$	0.237	0.241	
$\tilde{\chi}_3^0$	306.3	306.3		$\tilde{\chi}_1^0 Z^0$	0.627	0.622	
				$\tilde{\tau}_1^- \tau^+$	0.120	0.122	
				$\tilde{\tau}_1^+ \tau^-$	0.120	0.122	
$\tilde{\chi}_4^0$	379.9	380.1		$\tilde{\chi}_1^+ W^-$	0.131	0.249	
				$\tilde{\chi}_1^- W^+$	0.131	0.249	
				$\tilde{e}_L^- e^+$	0.044	0.030	
				$\tilde{e}_L^+ e^-$	0.044	0.030	
				$\tilde{\mu}_L^- \mu^+$	0.044	0.030	
				$\tilde{\mu}_L^+ \mu^-$	0.044	0.030	
				$\tilde{\tau}_2^- \tau^+$	0.046	0.032	
				$\tilde{\tau}_2^+ \tau^-$	0.046	0.032	
				$\tilde{\nu}_e \bar{\nu}_e$	0.071	0.048	
				$\bar{\tilde{\nu}}_e \nu_e$	0.071	0.048	
				$\tilde{\nu}_\mu \bar{\nu}_\mu$	0.071	0.048	
				$\bar{\tilde{\nu}}_\mu \nu_\mu$	0.071	0.048	
				$\tilde{\nu}_\tau \bar{\nu}_\tau$	0.071	0.048	
				$\bar{\tilde{\nu}}_\tau \nu_\tau$	0.071	0.048	

Table 2: Neutralino masses (GeV) and significant branching ratios ($> 3\%$) from Isajet (I), Susygen (S) and Pythia (P)

particle	m_I	m_S	m_P	decay	$\mathcal{B}_I$	$\mathcal{B}_S$	$\mathcal{B}_P$
$\tilde{\chi}_1^+$	256.3	256.0		$\tilde{\chi}_1^0 W^+$	0.292	0.954	
				$\tilde{\tau}_1^+ \nu_\tau$	0.638		
$\tilde{\chi}_2^+$	379.5	379.7		$\tilde{\chi}_2^0 W^+$	0.143	0.109	
				$\tilde{\nu}_e e^+$	0.118	0.090	
				$\tilde{\nu}_\mu \mu^+$	0.118	0.090	
				$\tilde{\nu}_\tau \tau^+$	0.122	0.094	
				$\tilde{e}_L^+ \nu_e$	0.131	0.100	
				$\tilde{\mu}_L^+ \nu_\mu$	0.131	0.100	
				$\tilde{\tau}_2^+ \nu_\tau$	0.131	0.103	
				$\tilde{\chi}_1^+ Z^0$	0.092	0.304	

Table 3: Chargino masses (GeV) and significant branching ratios (> 3%) from Isajet (I), Susygen (S) and Pythia (P)

particle	m_I	m_S	m_P	decay	$\mathcal{B}_I$	$\mathcal{B}_S$	$\mathcal{B}_P$
h^0	113.6	113.9		$\tau^-\tau^+$	0.051	0.070	
				$b\bar{b}$	0.854	0.810	
				$c\bar{c}$	0.032		
				gg		0.052	
				W^+W^-		0.045	
H^0	378.4	400.2		$\tau^-\tau^+$	0.066	0.097	
				$b\bar{b}$	0.921	0.877	
A^0	377.9	400.0		$\tau^-\tau^+$	0.065	0.096	
				$b\bar{b}$	0.898	0.868	
				$t\bar{t}$		0.034	
H^+	386.7	407.4		$\nu_\tau \tau^+$	0.107	0.118	
				$t\bar{b}$	0.887	0.878	

Table 4: Higgs masses (GeV) and significant branching ratios (> 3%) from Isajet (I), Susygen (S) and Pythia (P)

particle	m_I	m_S	m_P	decay	$\mathcal{B}_I$	$\mathcal{B}_S$	$\mathcal{B}_P$
$\tilde{t}_1$	779.1	779.1		$\tilde{\chi}_1^0 t$	0.083	0.071	
				$\tilde{\chi}_2^0 t$	0.156	0.152	
				$\tilde{\chi}_3^0 t$	0.263	0.190	
				$\tilde{\chi}_1^+ b$	0.409	0.463	
				$\tilde{\chi}_2^+ b$	0.065	0.095	
$\tilde{t}_2$	863.0	863.0		$\tilde{\chi}_1^+ b$	0.047	0.126	
				$\tilde{\chi}_2^+ b$	0.310	0.253	
				$\tilde{\chi}_2^0 t$	0.133	0.066	
				$\tilde{\chi}_3^0 t$	0.221	0.173	
				$\tilde{\chi}_4^0 t$	0.282	0.144	
				$\tilde{g} t$		0.214	
$\tilde{b}_1$	822.2	822.2		$\tilde{\chi}_1^0 b$	0.115	0.121	
				$\tilde{\chi}_2^0 b$	0.167	0.226	
				$\tilde{\chi}_3^0 b$	0.059	0.130	
				$\tilde{\chi}_1^- t$	0.438	0.481	
				$\tilde{\chi}_2^- t$	0.205	0.034	
$\tilde{b}_2$	843.4	843.4		$\tilde{\chi}_2^0 b$	0.048	0.089	
				$\tilde{\chi}_3^0 b$	0.041	0.132	
				$\tilde{\chi}_4^0 b$	0.115	0.196	
				$\tilde{\chi}_1^- t$	0.297	0.130	
				$\tilde{\chi}_2^- t$	0.492	0.448	

Table 5: Light squark masses (GeV) and significant branching ratios ($> 3\%$) from Isajet (I), Susygen (S) and Pythia (P)

8 SPS 8 – GMSB scenario

Λ	100 TeV
M_{mess}	200 TeV
N_{mess}	1
$\tan\beta$	15
sign μ	$+$

$$\mathrm{NLSP} = \tilde{\chi}_1^0$$
$$M_{mess} = 2\,\Lambda$$

8.1 Spectrum & parameters of ISAJET 7.58

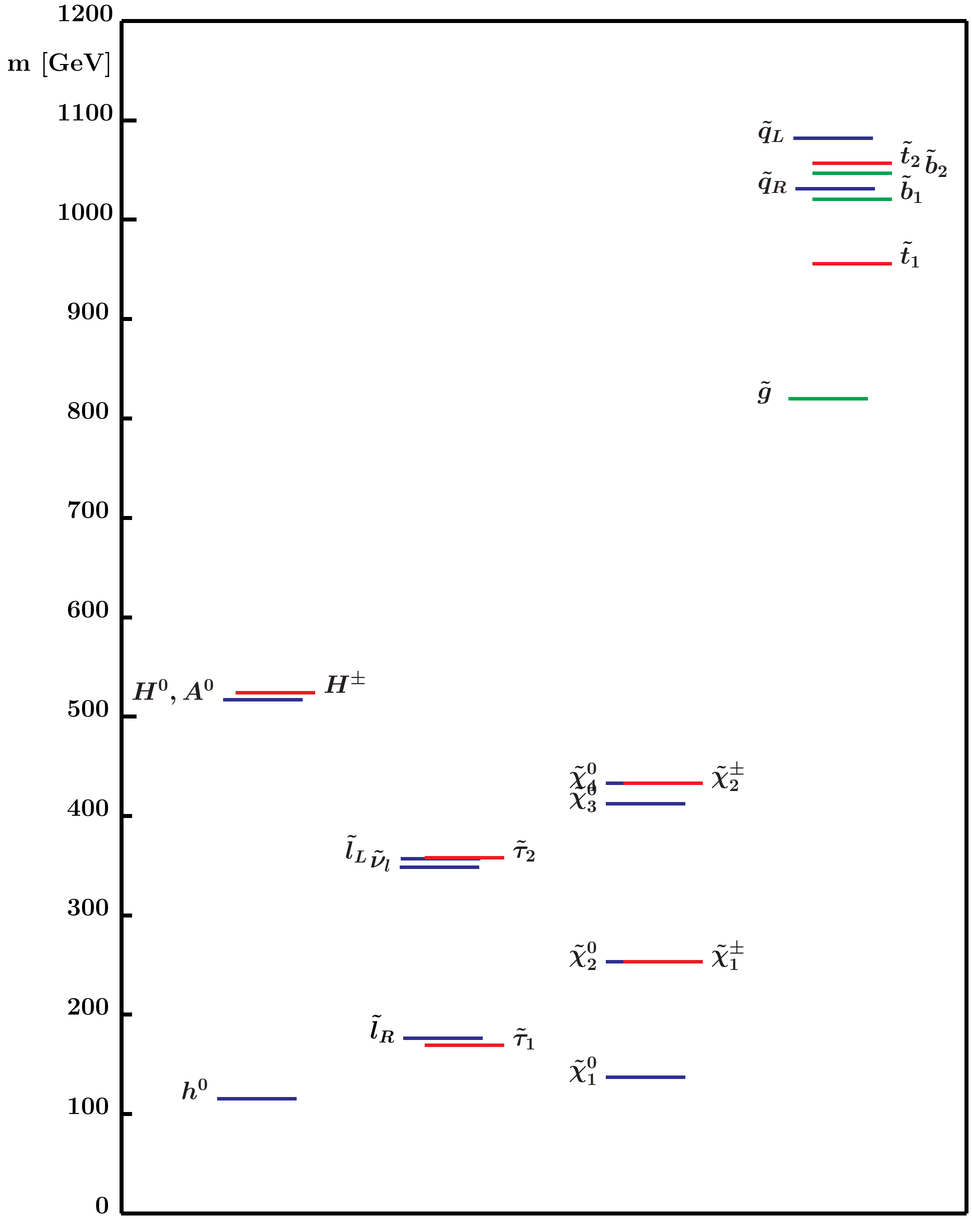

Figure 1: SPS 8 mass spectrum of ISAJET

Isajet parameters

```
Minimal gauge mediated (GMSB) model:

Lambda,  M_mes,  N_5,  tan(beta),  sgn(mu),  M_t,  C_grav=
0.100E+06 0.200E+06     1.000    15.000     1.0   175.000  0.100E+01

GMSB2 model input:
Rsl,    dmH_d^2,   dmH_u^2,     d_Y,     N5_1,  N5_2,  N5_3=
 1.000  0.000E+00  0.000E+00  0.000E+00    1.000  1.000  1.000

M(gravitino)= 0.481E-08

1/alpha_em =  127.87     sin**2(thetaw) =0.2311     alpha_s   =0.118
M_1        =  140.00     M_2            =  271.80   M_3       =  755.00
mu(Q)      =  398.31     B(Q)           =   44.32   Q         =  987.76
M_H1^2     = 0.111E+06   M_H2^2         =-0.135E+06

ISAJET masses (with signs):
M(GL)  =   820.50
M(UL)  =  1080.25   M(UR)  =  1033.16   M(DL)  =  1083.17   M(DR) =  1029.29
M(B1)  =  1021.90   M(B2)  =  1048.26   M(T1)  =   957.65   M(T2) =  1058.68
M(SN)  =   347.61   M(EL)  =   356.61   M(ER)  =   175.87
M(NTAU)=   346.94   M(TAU1)=   169.42   M(TAU2)=   357.59
M(Z1)  =  -137.19   M(Z2)  =  -252.33   M(Z3)  =   404.00   M(Z4) =  -426.28
M(W1)  =  -252.03   M(W2)  =  -426.47
M(HL)  =   114.83   M(HH)  =   515.01   M(HA)  =   514.49   M(H+) =   521.17

theta_t=   1.3169   theta_b=   1.1767   theta_l=   1.4639   alpha_h=   0.0719

NEUTRALINO MASSES (SIGNED) =  -137.192  -252.334   404.003  -426.276
EIGENVECTOR 1       =   0.05427  -0.13503  -0.03750   0.98864
EIGENVECTOR 2       =   0.20544  -0.30581  -0.92547  -0.08815
EIGENVECTOR 3       =   0.70961   0.69819  -0.07827   0.05344
EIGENVECTOR 4       =   0.67179  -0.63307   0.36873  -0.10936

CHARGINO MASSES (SIGNED)  =  -252.028  -426.469
GAMMAL, GAMMAR             =   2.02894   1.87308


ISAJET equivalent input:
MSSMA:   820.50  398.31  514.49   15.00
MSSMB:  1081.56 1028.98 1033.78  353.48  170.37
MSSMC:  1042.74 1025.51  952.74  352.82  167.23 -296.71 -330.28  -36.69
MSSMD: SAME AS MSSMB (DEFAULT)
MSSME:   140.00  271.80
WARNING IN SSXINT: BAD CONVERGENCE FOR  508 INTERVALS.
```

8.2 Spectrum & parameters of SUSYGEN 3.00/27

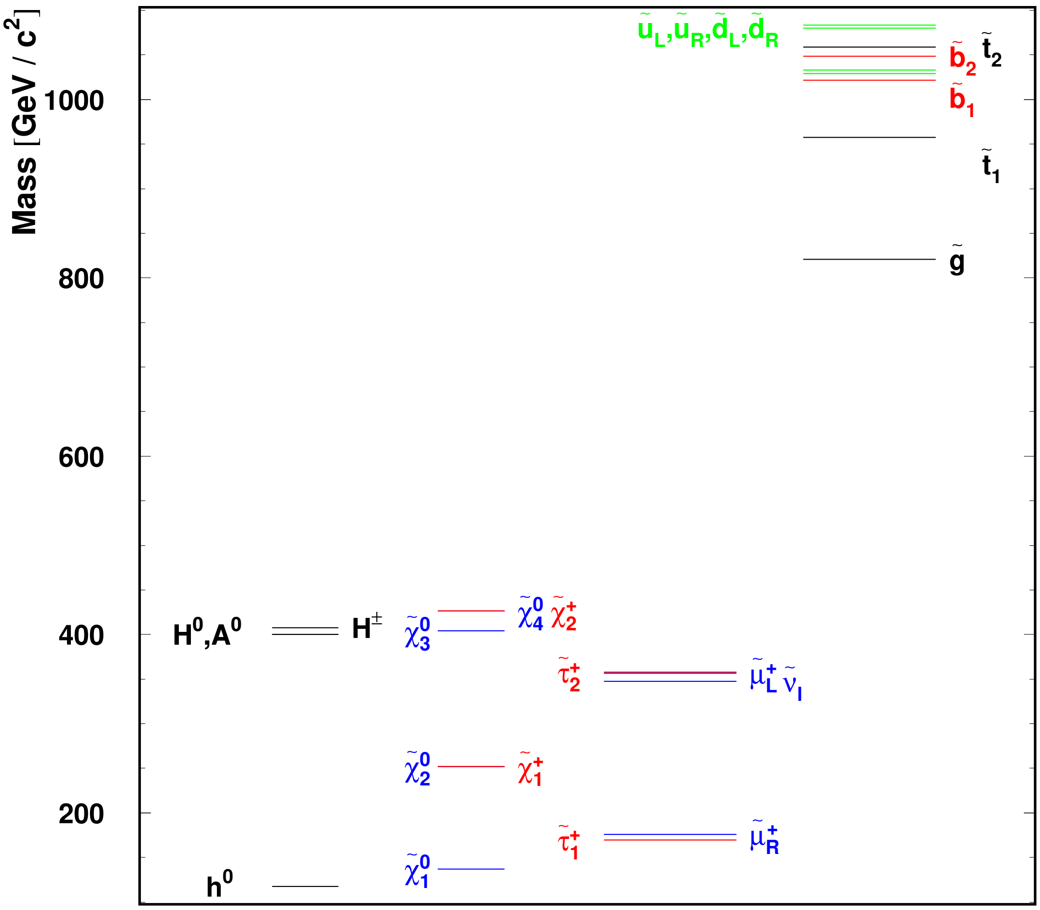

Figure 2: SPS 8 mass spectrum of SUSYGEN

Susygen parameters

```
Susygen inputs:
--------------

M2      =   271.800   mu       =   398.310
M1      =   140.000   M3       =   755.000
XRFSUSY =   141.421   NFAM     =     1
TANB    =    15.000

Sparticle masses:  (input from Isajet)
----------------

SUPR     1033.  SUPL      1080.
SDNR     1029.  SDNL      1083.
SELR      176.  SELL       357.
SNU       348.
STP1      958.  STP2      1059. cosmix =  0.425
SBT1     1022.  SBT2      1048. cosmix =  0.384
STA1      169.  STA2       358. cosmix=   0.107
SGLU      820.

Gravitino mass: 4.81125246  eV
--------------

Gaugino masses:
--------------

M1 =    140.000 M2 =    271.800 M3 =    755.000

NEUTRALINO m, CP, ph/zi/ha/hb 1 =  137.2  1.  0.849 -0.508  0.063  0.131
NEUTRALINO m, CP, ph/zi/ha/hb 2 =  252.2  1. -0.522 -0.769  0.226  0.292
NEUTRALINO m, CP, ph/zi/ha/hb 3 =  404.0 -1. -0.009  0.095 -0.662  0.744
NEUTRALINO m, CP, ph/zi/ha/hb 4 =  426.4  1. -0.082 -0.377 -0.712 -0.587

CHARGINO MASSES    =   251.761   426.622
CHARGINO ETA      =    -1.000     1.000

U matrix      WINO      HIGGSINO      V matrix      WINO     HIGGSINO
W1SS+       -0.896     0.443         W1SS-         0.955   -0.298
W2SS+        0.443     0.896         W2SS-         0.298    0.955

Higgses masses:
--------------

Light CP-even Higgs =   116.282
Heavy CP-even Higgs =   400.221
      CP-odd  Higgs =   400.000
      Charged Higgs =   407.301
      sin(a-b)      =    -0.076
      cos(a-b)      =     0.997
```

8.3 Spectrum & parameters of PYTHIA 6.2/00

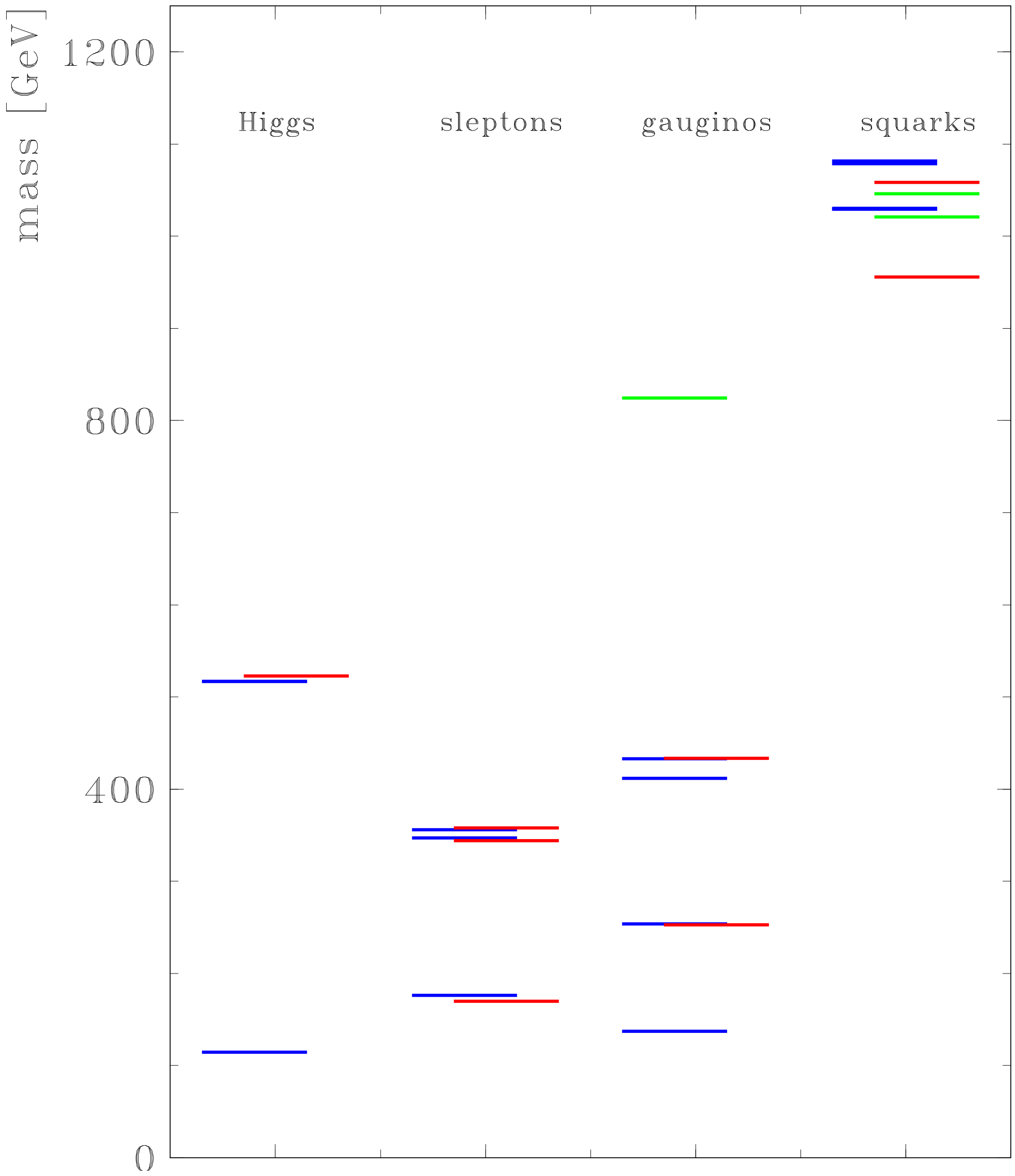

Figure 3: SPS 8 mass spectrum of PYTHIA

Pythia parameters

```
MSSM input parameters
---------------------
M_1         RMSS( 1) =   140.0
M_2         RMSS( 2) =   272.0
M_3         RMSS( 3) =   740.0
tan_beta    RMSS( 5) =   15.00
mu          RMSS( 4) =   406.0

sparticle masses & widths
-------------------------
M_se_R   176.0 ( 0.134)   M_se_L   356.0 ( 1.239)   M_sne_L  346.9 ( 1.197)
M_sm_R   176.0 ( 0.134)   M_sm_L   356.0 ( 1.239)   M_snm_L  346.9 ( 1.197)
M_st_1   169.8 ( 0.101)   M_st_2   357.9 ( 1.342)   M_snt_L  343.8 ( 1.248)

M_ch0_1  137.3 ( 0.000)   M_ch0_2  253.5 ( 0.028)   M_ch0_3  411.6 ( 1.832)
M_ch0_4  432.9 ( 2.306)
M_ch+_1  252.8 ( 0.026)   M_ch+_2  433.4 ( 2.192)

M_h0     114.3 ( 0.004)   M_H0     517.0 ( 2.425)   M_A0     516.9 ( 2.456)
M_H+     522.9 ( 2.256)

M_g~     824.3 ( 0.021)
M_uL    1078.7 (23.774)   M_uR    1029.4 (10.449)   M_dL    1081.6 (23.823)
M_dR    1030.3 ( 8.794)
M_b1    1021.0 (12.139)   M_b2    1045.9 (29.128)   M_t1     955.9 (23.923)
M_t2    1058.4 (28.340)

parameter settings IMSS, RMSS
-----------------------------
IMSS( 1) = 1   IMSS( 4) = 1   IMSS( 7) = 0   IMSS(10) = 0
IMSS( 2) = 0   IMSS( 5) = 0   IMSS( 8) = 0   IMSS(11) = 1
IMSS( 3) = 0   IMSS( 6) = 0   IMSS( 9) = 0   IMSS(12) = 0

RMSS( 1) =   140.0       RMSS( 9) =   1030.       RMSS(17) =  -35.00
RMSS( 2) =   272.0       RMSS(10) =   1040.       RMSS(18) = -0.7168E-01
RMSS( 3) =   740.0       RMSS(11) =   1025.       RMSS(19) =   517.0
RMSS( 4) =   406.0       RMSS(12) =   950.0       RMSS(20) =  0.4100E-01
RMSS( 5) =   15.00       RMSS(13) =   353.0       RMSS(21) =   1.000
RMSS( 6) =   356.0       RMSS(14) =   168.0       RMSS(22) =   1030.
RMSS( 7) =   176.0       RMSS(15) =  -330.0       RMSS(23) =  0.1000E+05
RMSS( 8) =   1080.       RMSS(16) =  -295.0       RMSS(24) =  0.1000E+05
```

8.4 Decay modes

particle	m_I	m_S	m_P	decay	$\mathcal{B}_I$	$\mathcal{B}_S$	$\mathcal{B}_P$
$\tilde{e}_R^-$	175.9	175.9	176.0	$\tilde{\chi}_1^0 e^-$	1.000	1.000	1.000
$\tilde{e}_L^-$	356.6	356.6	356.0	$\tilde{\chi}_1^0 e^-$	0.225	0.224	0.228
				$\tilde{\chi}_2^0 e^-$	0.287	0.287	0.283
				$\tilde{\chi}_1^- \nu_e$	0.488	0.490	0.489
$\tilde{\nu}_e$	347.6	347.6	346.9	$\tilde{\chi}_1^0 \nu_e$	0.292	0.291	0.294
				$\tilde{\chi}_2^0 \nu_e$	0.209	0.209	0.209
				$\tilde{\chi}_1^+ e^-$	0.499	0.500	0.497
$\tilde{\mu}_R^-$	175.9	175.9	176.0	$\tilde{\chi}_1^0 \mu^-$	1.000	1.000	1.000
$\tilde{\mu}_L^-$	356.6	356.6	356.0	$\tilde{\chi}_1^0 \mu^-$	0.225	0.224	0.228
				$\tilde{\chi}_2^0 \mu^-$	0.287	0.287	0.283
				$\tilde{\chi}_1^- \nu_\mu$	0.488	0.490	0.489
$\tilde{\nu}_\mu$	347.6	347.6	346.9	$\tilde{\chi}_1^0 \nu_\mu$	0.292	0.291	0.294
				$\tilde{\chi}_2^0 \nu_\mu$	0.209	0.209	0.209
				$\tilde{\chi}_1^+ \mu^-$	0.499	0.500	0.497
$\tilde{\tau}_1^-$	169.4	169.4	169.8	$\tilde{\chi}_1^0 \tau^-$	1.000	1.000	1.000
$\tilde{\tau}_2^-$	357.6	357.6	357.9	$\tilde{\chi}_1^0 \tau^-$	0.215	0.232	0.218
				$\tilde{\chi}_2^0 \tau^-$	0.262	0.286	0.262
				$\tilde{\chi}_1^- \nu_\tau$	0.441	0.482	0.447
				$Z^0 \tilde{\tau}_1^-$	0.038		0.041
				$h^0 \tilde{\tau}_1^-$	0.044		0.032
$\tilde{\nu}_\tau$	346.9	346.9	343.8	$\tilde{\chi}_1^0 \nu_\tau$	0.271	0.292	0.278
				$\tilde{\chi}_2^0 \nu_\tau$	0.193	0.209	0.191
				$\tilde{\chi}_1^+ \tau^-$	0.463	0.499	0.456
				$W^+ \tilde{\tau}_1^-$	0.073		0.075

Table 1: Slepton masses (GeV) and significant branching ratios ($> 3\%$) from Isajet (I), Susygen (S) and Pythia (P)

particle	m_I	m_S	m_P	decay	$\mathcal{B}_I$	$\mathcal{B}_S$	$\mathcal{B}_P$
$\tilde{\chi}_1^0$	137.2	137.2	137.3	$\tilde{G}\gamma$	0.947	0.974	0.968
				$\tilde{G}Z^0$	0.033		0.032
$\tilde{\chi}_2^0$	252.3	252.2	253.5	$\tilde{\chi}_1^0 Z^0$	0.086	0.091	0.075
				$\tilde{\chi}_1^0 h^0$	0.078		0.168
				$\tilde{e}_R^- e^+$	0.053	0.057	0.043
				$\tilde{e}_R^+ e^-$	0.053	0.057	0.043
				$\tilde{\mu}_R^- \mu^+$	0.053	0.057	0.043
				$\tilde{\mu}_R^+ \mu^-$	0.053	0.057	0.043
				$\tilde{\tau}_1^- \tau^+$	0.311	0.340	0.292
				$\tilde{\tau}_1^+ \tau^-$	0.311	0.340	0.292
$\tilde{\chi}_3^0$	404.0	404.0	411.7	$\tilde{\chi}_1^+ W^-$	0.289	0.363	0.291
				$\tilde{\chi}_1^- W^+$	0.289	0.363	0.291
				$\tilde{\chi}_1^0 Z^0$	0.142	0.092	0.133
				$\tilde{\chi}_2^0 Z^0$	0.207	0.134	0.211
$\tilde{\chi}_4^0$	426.3	426.4	432.9	$\tilde{\chi}_1^+ W^-$	0.307	0.361	0.303
				$\tilde{\chi}_1^- W^+$	0.307	0.361	0.303
				$\tilde{\chi}_1^0 h^0$	0.087	0.063	0.082
				$\tilde{\chi}_2^0 h^0$	0.142	0.102	0.153

Table 2: Neutralino masses (GeV) and significant branching ratios ($> 3\%$) from Isajet (I), Susygen (S) and Pythia (P)

particle	m_I	m_S	m_P	decay	$\mathcal{B}_I$	$\mathcal{B}_S$	$\mathcal{B}_P$
$\tilde{\chi}_1^+$	252.0	251.8	252.8	$\tilde{\chi}_1^0 W^+$	0.508	0.899	0.480
				$\tilde{\tau}_1^+ \nu_\tau$	0.491	0.099	0.520
$\tilde{\chi}_2^+$	426.5	426.6	433.4	$\tilde{\chi}_1^0 W^+$	0.097	0.089	0.093
				$\tilde{\chi}_2^0 W^+$	0.348	0.323	0.343
				$\tilde{\chi}_1^+ Z^0$	0.283	0.509	0.281
				$\tilde{\chi}_1^+ h^0$	0.173		0.180

Table 3: Chargino masses (GeV) and significant branching ratios ($> 3\%$) from Isajet (I), Susygen (S) and Pythia (P)

particle	m_I	m_S	m_P	decay	$\mathcal{B}_I$	$\mathcal{B}_S$	$\mathcal{B}_P$
h^0	114.8	117.3	114.3	$\tau^-\tau^+$	0.050	0.077	0.066
				$b\bar{b}$	0.837	0.758	0.789
				$c\bar{c}$	0.036		0.043
				gg		0.057	0.035
				W^+W^-		0.076	0.055
H^0	515.0	400.1	517.0	$\tau^-\tau^+$	0.067	0.112	0.100
				$b\bar{b}$	0.888	0.860	0.874
A^0	514.5	400.0	516.9	$\tau^-\tau^+$	0.063	0.107	0.099
				$b\bar{b}$	0.845	0.822	0.864
				$t\bar{t}$	0.031	0.038	0.036
				$\tilde{\chi}_1^0\tilde{\chi}_2^0$	0.033		
H^+	521.2	407.3	523.0	$\nu_\tau\tau^+$	0.086	0.131	0.109
				$t\bar{b}$	0.854	0.833	0.890
				$\tilde{\chi}_1^+\tilde{\chi}_1^0$	0.056	0.033	

Table 4: Higgs masses (GeV) and significant branching ratios ($> 3\%$) from Isajet (I), Susygen (S) and Pythia (P)

particle	m_I	m_S	m_P	decay	$\mathcal{B}_I$	$\mathcal{B}_S$	$\mathcal{B}_P$
$\tilde{t}_1$	957.6	957.7	955.9	$\tilde{\chi}_1^0 t$	0.089	0.066	0.081
				$\tilde{\chi}_2^0 t$	0.057	0.077	0.056
				$\tilde{\chi}_3^0 t$	0.245	0.195	0.248
				$\tilde{\chi}_4^0 t$	0.140	0.122	0.144
				$\tilde{\chi}_1^+ b$	0.131	0.197	0.127
				$\tilde{\chi}_2^+ b$	0.339	0.343	0.345
$\tilde{t}_2$	1058.7	1058.7	1058.4	$\tilde{g} t$	0.269	0.230	0.140
				$\tilde{\chi}_1^+ b$	0.174	0.125	0.189
				$\tilde{\chi}_2^+ b$	0.098	0.282	0.092
				$\tilde{\chi}_2^0 t$	0.088	0.041	0.102
				$\tilde{\chi}_3^0 t$	0.158	0.195	0.204
				$\tilde{\chi}_4^0 t$	0.209	0.122	0.267
$\tilde{b}_1$	1021.9	1021.9	1021.5	$\tilde{\chi}_1^0 b$	0.049	0.038	0.041
				$\tilde{\chi}_2^0 b$	0.075	0.069	0.046
				$\tilde{\chi}_3^0 b$	0.030	0.050	
				$\tilde{g} b$	0.594	0.651	0.639
				$\tilde{\chi}_1^- t$	0.144	0.132	0.093
				$\tilde{\chi}_2^- t$	0.098	0.037	0.175
$\tilde{b}_2$	1048.3	1048.3	1045.9	$\tilde{\chi}_2^0 b$	0.082	0.082	0.095
				$\tilde{\chi}_3^0 b$		0.046	
				$\tilde{\chi}_4^0 b$	0.038	0.063	
				$\tilde{g} b$	0.322	0.509	0.312
				$\tilde{\chi}_1^- t$	0.164	0.144	0.197
				$\tilde{\chi}_2^- t$	0.367	0.152	0.373

Table 5: Light squark masses (GeV) and significant branching ratios ($> 3\%$) from Isajet (I), Susygen (S) and Pythia (P)

9 SPS 9 – AMSB scenario

m_0	400 GeV
$m_{3/2}$	60 TeV
$\tan\beta$	10
sign μ	$+$

$$m_0 = 0.0075\, m_{3/2}$$

9.1 Spectrum & parameters of ISAJET 7.58

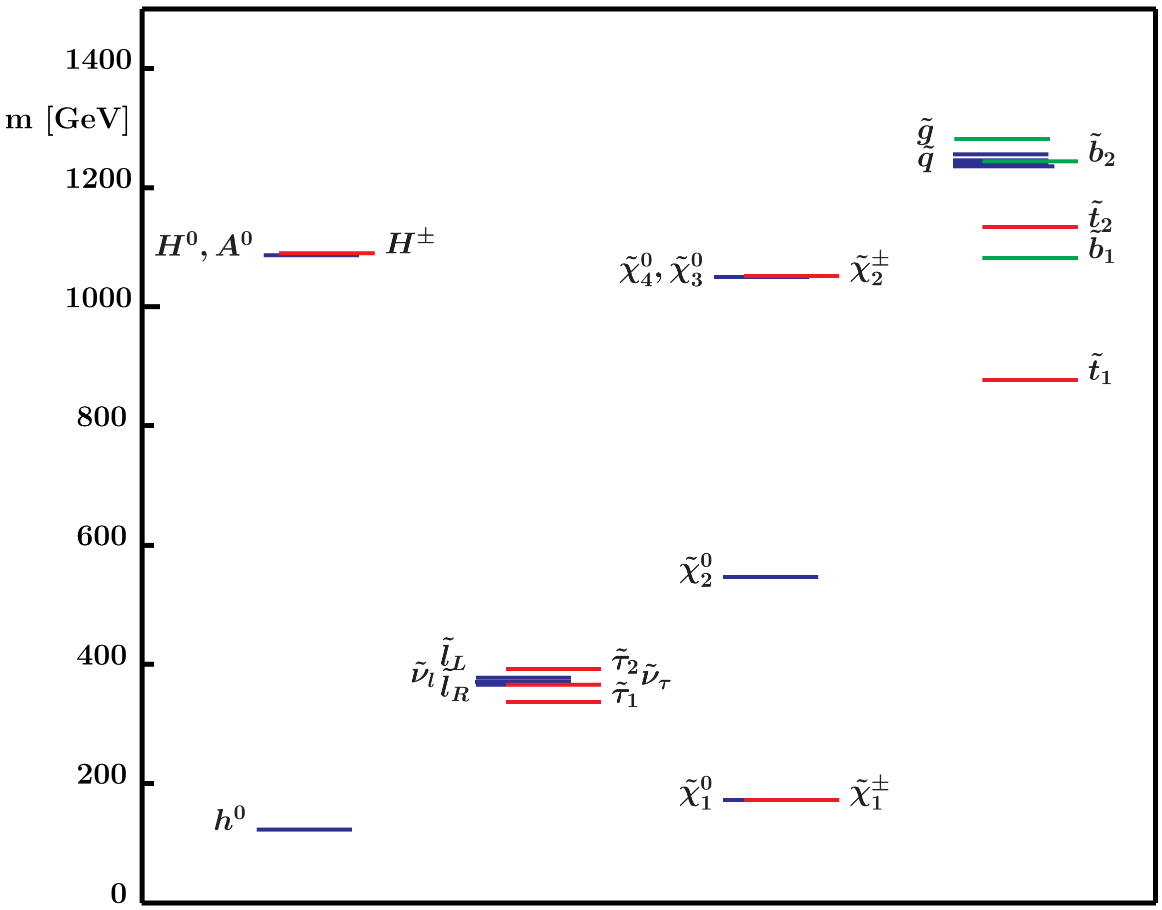

Figure 1: SPS 9 mass spectrum of ISAJET

Isajet parameters

```
WARNING: TACHYONIC SLEPTONS AT GUT SCALE
         POINT MAY BE INVALID

Supergravity model with right-handed neutrinos:

M_0,  M_(3/2),  tan(beta),  sgn(mu),  M_t =
  400.000 60000.000    10.000     1.0   175.000

ISASUGRA unification:
M_GUT      = 0.101E+17   g_GUT          =0.711      alpha_GUT =0.040
FT_GUT     = 0.476       FB_GUT         = 0.046     FL_GUT = 0.069

1/alpha_em =  127.81     sin**2(thetaw) =0.2306     alpha_s   =0.120
M_1        = -550.60     M_2            = -175.53   M_3       = 1232.27
mu(Q)      =  869.90     B(Q)           =   94.70   Q         = 1076.05
M_H1^2     = 0.714E+05   M_H2^2         =-0.720E+06

ISAJET masses (with signs):
M(GL)  =  1275.18
M(UL)  =  1218.09   M(UR)  =  1227.35   M(DL)  =  1220.65   M(DR) =  1237.81
M(B1)  =  1112.07   M(B2)  =  1232.88   M(T1)  =  1005.17   M(T2) =  1128.80
M(SN)  =   309.71   M(EL)  =   319.66   M(ER)  =   303.01
M(NTAU)=   300.71   M(TAU1)=   271.28   M(TAU2)=   322.54
M(Z1)  =   175.51   M(Z2)  =   549.03   M(Z3)  =  -874.37   M(Z4) =   875.97
M(W1)  =   175.67   M(W2)  =   877.22
M(HL)  =   114.83   M(HH)  =   912.56   M(HA)  =   911.74   M(H+) =   915.83

theta_t=   1.3055   theta_b=   0.0919   theta_l=   1.0546   alpha_h=   0.1020

NEUTRALINO MASSES (SIGNED) =   175.505   549.027  -874.365   875.970
EIGENVECTOR 1       =  -0.00966  -0.09301  -0.99562   0.00004
EIGENVECTOR 2       =   0.04358   0.07687  -0.00765  -0.99606
EIGENVECTOR 3       =   0.70715  -0.70420   0.05892  -0.02386
EIGENVECTOR 4       =   0.70565   0.69968  -0.07220   0.08543

CHARGINO MASSES (SIGNED)  =   175.672   877.221
GAMMAL, GAMMAR             =   1.70212   1.55731


ISAJET equivalent input:
MSSMA:  1275.18  869.90  911.74   10.00
MSSMB:  1219.24 1237.55 1227.86  316.22  299.89
MSSMC:  1111.59 1231.65 1003.22  307.41  281.16 -350.26  216.41 1162.39
MSSMD: SAME AS MSSMB (DEFAULT)
MSSME:  -550.60 -175.53
WARNING IN SSXINT: BAD CONVERGENCE FOR  264 INTERVALS.
```

9.2 Spectrum & parameters of SUSYGEN 3.00/27

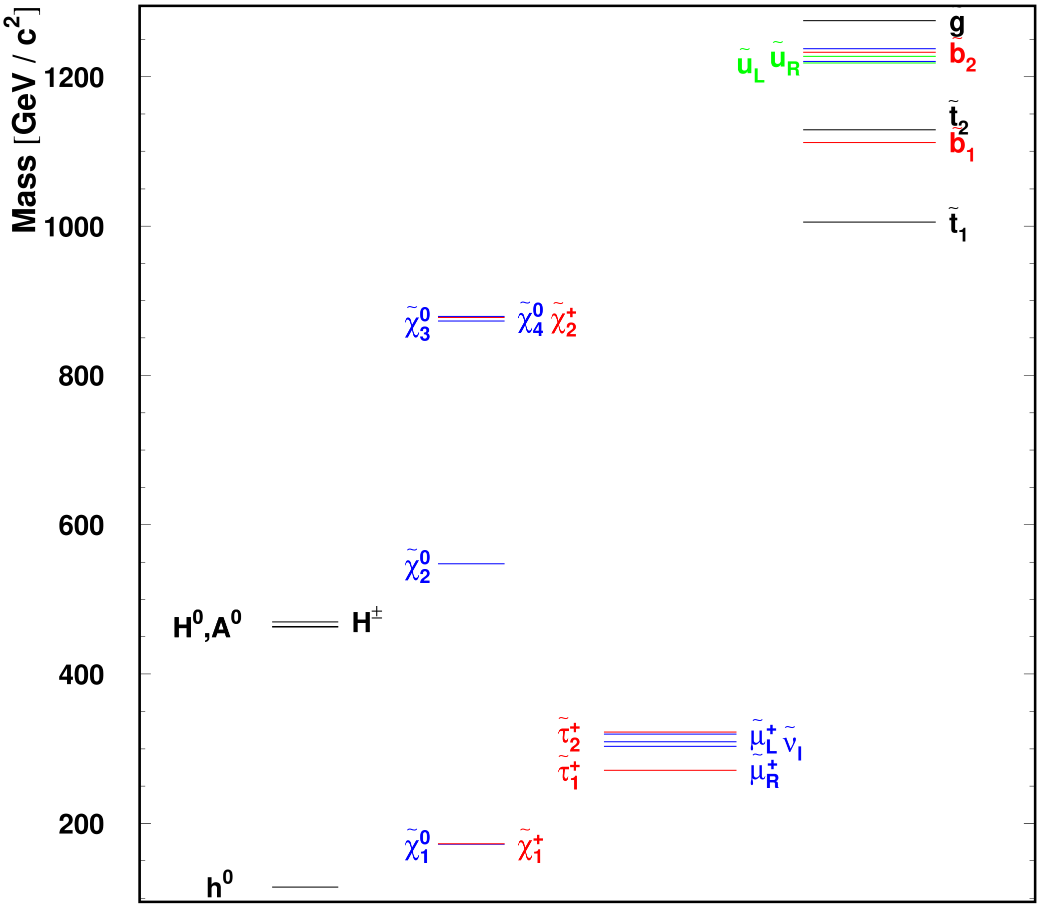

Figure 2: SPS 9 mass spectrum of SUSYGEN

Susygen parameters

```
Susygen inputs:
--------------
M2      =   175.530   mu       =   869.900
M1      =   550.600   M3       =  1232.270
TANB    =    10.000

Sparticle masses: (input from Isajet)
----------------

SUPR     1227.  SUPL      1218.
SDNR     1238.  SDNL      1221.
SELR      303.  SELL       320.
SNU       310.
STP1     1005.  STP2      1129. cosmix =  0.262
SBT1     1112.  SBT2      1233. cosmix =  0.996
STA1      271.  STA2       323. cosmix=   0.493
SGLU     1275.

Gaugino masses:
--------------

M1 =    550.600 M2 =    175.530 M3 =   1232.270

NEUTRALINO m, CP, ph/zi/ha/hb 1 =  172.5  1. -0.475 -0.874  0.038  0.094
NEUTRALINO m, CP, ph/zi/ha/hb 2 =  547.6  1.  0.879 -0.466  0.067  0.079
NEUTRALINO m, CP, ph/zi/ha/hb 3 =  872.9 -1.  0.006  0.052 -0.634  0.772
NEUTRALINO m, CP, ph/zi/ha/hb 4 =  878.9  1.  0.048 -0.126 -0.769 -0.624

CHARGINO MASSES    =   172.486   877.866
CHARGINO ETA       =    -1.000     1.000

U matrix      WINO      HIGGSINO      V matrix      WINO     HIGGSINO
W1SS+        -0.991     0.136         W1SS-         0.999   -0.040
W2SS+         0.136     0.991         W2SS-         0.040    0.999

Higgses masses:
--------------
Light CP-even Higgs =   114.830
Heavy CP-even Higgs =   912.560
      CP-odd  Higgs =   911.740
      Charged Higgs =   915.830
      sin(a-b)      =     0.102
      cos(a-b)      =     0.995
```

9.3 Spectrum & parameters of PYTHIA 6.2/00

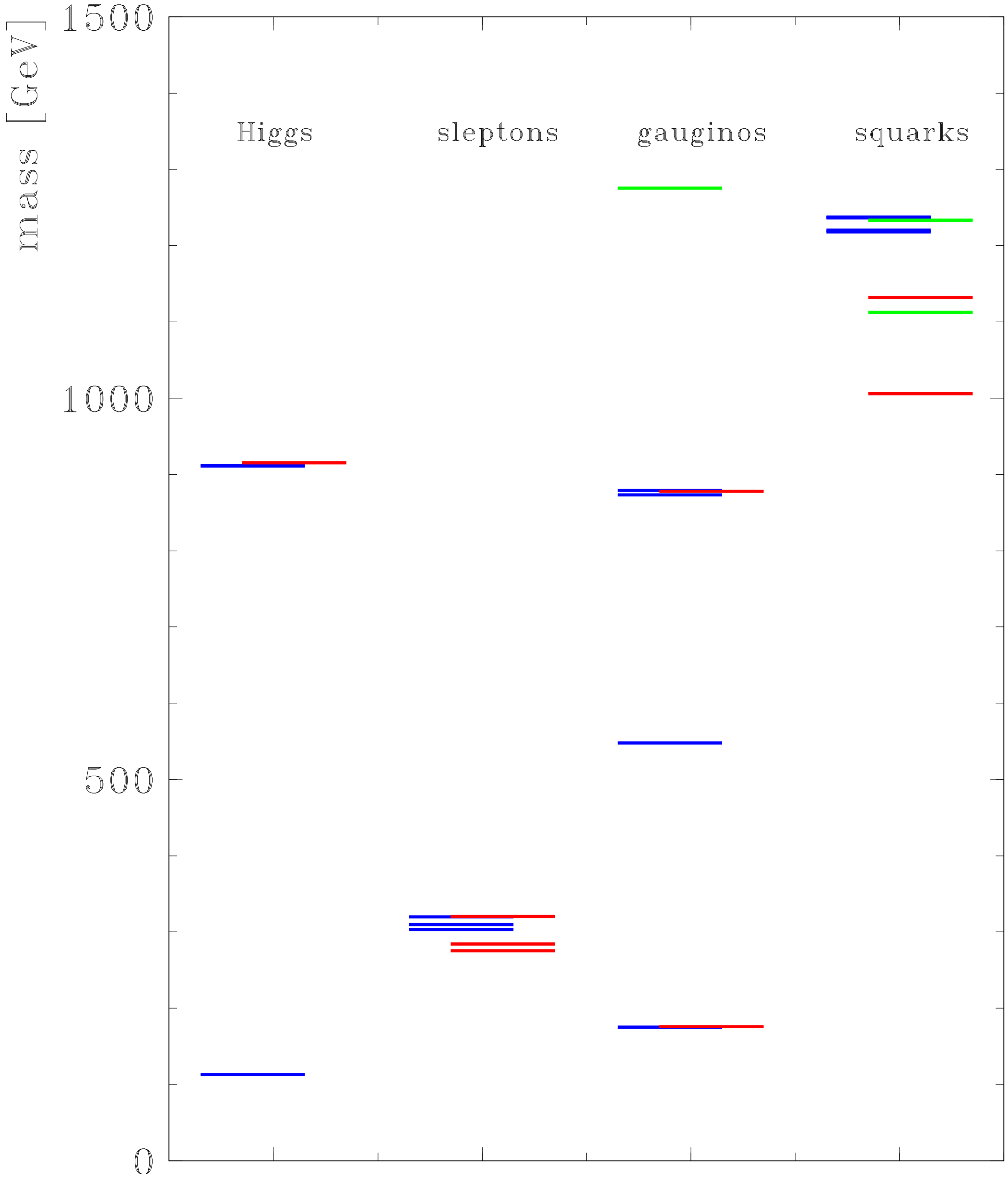

Figure 3: SPS 9 mass spectrum of PYTHIA

Pythia parameters

```
MSSM input parameters
---------------------
M_1         RMSS( 1) =   550.6
M_2         RMSS( 2) =   178.5
M_3         RMSS( 3) =   1200.
tan_beta    RMSS( 5) =   10.00
mu          RMSS( 4) =   870.0

sparticle masses & widths
-------------------------
M_se_R   303.0 ( 0.000)   M_se_L   319.7 ( 1.949)   M_sne_L  309.6 ( 1.807)
M_sm_R   303.0 ( 0.000)   M_sm_L   319.7 ( 1.949)   M_snm_L  309.6 ( 1.807)
M_st_1   275.4 ( 0.619)   M_st_2   320.4 ( 0.959)   M_snt_L  284.5 ( 1.381)

M_ch0_1  175.4 ( 0.000)   M_ch0_2  547.6 ( 6.016)   M_ch0_3  873.0 ( 6.869)
M_ch0_4  879.0 ( 7.023)
M_ch+_1  175.7 ( 0.000)   M_ch+_2  878.0 ( 7.060)

M_h0     113.3 ( 0.004)   M_H0     911.4 ( 2.071)   M_A0     911.1 ( 2.112)
M_H+     915.3 ( 2.236)

M_g~    1275.4 ( 5.103)
M_uL    1217.8 (15.156)   M_uR    1236.5 ( 1.836)   M_dL    1220.4 (15.051)
M_dR    1237.2 ( 0.460)
M_b1    1112.5 (15.069)   M_b2    1233.2 ( 0.654)   M_t1    1005.5 ( 3.225)
M_t2    1132.0 (15.159)

parameter settings IMSS, RMSS
-----------------------------
IMSS( 1) = 1   IMSS( 4) = 1   IMSS( 7) = 0   IMSS(10) = 0
IMSS( 2) = 0   IMSS( 5) = 0   IMSS( 8) = 0   IMSS(11) = 0
IMSS( 3) = 0   IMSS( 6) = 0   IMSS( 9) = 0   IMSS(12) = 0

RMSS( 1) =   550.6       RMSS( 9) =   1237.       RMSS(17) =   1162.
RMSS( 2) =   178.5       RMSS(10) =   1112.       RMSS(18) = -0.1020
RMSS( 3) =   1200.       RMSS(11) =   1232.       RMSS(19) =   912.0
RMSS( 4) =   870.0       RMSS(12) =   1003.       RMSS(20) =  0.4100E-01
RMSS( 5) =   10.00       RMSS(13) =   295.4       RMSS(21) =   1.000
RMSS( 6) =   319.7       RMSS(14) =   295.2       RMSS(22) =   1237.
RMSS( 7) =   303.0       RMSS(15) =   216.4       RMSS(23) =  0.1000E+05
RMSS( 8) =   1219.       RMSS(16) =  -350.3       RMSS(24) =  0.1000E+05
```

9.4 Decay modes

particle	m_I	m_S	m_P	decay	$\mathcal{B}_I$	$\mathcal{B}_S$	$\mathcal{B}_P$
$\tilde{e}_R^-$	303.0	303.0	303.0	$\tilde{\chi}_1^0 e^-$	0.103	1.000	1.000
				$\tilde{\tau}_1^- e^- \tau^+$	0.240		
				$\tilde{\tau}_1^+ e^- \tau^-$	0.657		
$\tilde{e}_L^-$	319.7	319.7	319.7	$\tilde{\chi}_1^0 e^-$	0.336	0.334	0.335
				$\tilde{\chi}_1^- \nu_e$	0.664	0.667	0.665
$\tilde{\nu}_e$	309.7	309.7	309.6	$\tilde{\chi}_1^0 \nu_e$	0.332	0.333	0.333
				$\tilde{\chi}_1^+ e^-$	0.668	0.667	0.667
$\tilde{\mu}_R^-$	303.0	303.0	303.0	$\tilde{\chi}_1^0 \mu^-$	0.103	0.886	0.888
				$\tilde{\chi}_1^- \nu_\mu$		0.114	0.112
				$\tilde{\tau}_1^- \mu^- \tau^+$	0.240		
				$\tilde{\tau}_1^+ \mu^- \tau^-$	0.657		
$\tilde{\mu}_L^-$	319.7	319.7	319.7	$\tilde{\chi}_1^0 \mu^-$	0.336	0.334	0.335
				$\tilde{\chi}_1^- \nu_\mu$	0.664	0.666	0.665
$\tilde{\nu}_\mu$	309.7	309.7	309.6	$\tilde{\chi}_1^0 \nu_\mu$	0.332	0.333	0.333
				$\tilde{\chi}_1^+ \mu^-$	0.668	0.667	0.667
$\tilde{\tau}_1^-$	271.3	271.3	275.4	$\tilde{\chi}_1^0 \tau^-$	0.336	0.334	0.335
				$\tilde{\chi}_1^- \nu_\tau$	0.664	0.666	0.665
$\tilde{\tau}_2^-$	322.5	322.5	320.4	$\tilde{\chi}_1^0 \tau^-$	0.336	0.334	0.335
				$\tilde{\chi}_1^- \nu_\tau$	0.664	0.666	0.665
$\tilde{\nu}_\tau$	300.7	300.7	284.5	$\tilde{\chi}_1^0 \nu_\tau$	0.332	0.333	0.333
				$\tilde{\chi}_1^+ \tau^-$	0.668	0.667	0.667

Table 1: Slepton masses (GeV) and significant branching ratios (> 3%) from Isajet (I), Susygen (S) and Pythia (P)

particle	m_I	m_S	m_P	decay	$\mathcal{B}_I$	$\mathcal{B}_S$	$\mathcal{B}_P$
$\tilde{\chi}_1^0$	175.5	172.5	175.4		1.000	1.000	1.000
$\tilde{\chi}_2^0$	549.0	547.6	547.6	$\tilde{e}_R^- e^+$	0.110	0.109	0.110
				$\tilde{e}_R^+ e^-$	0.110	0.109	0.110
				$\tilde{\mu}_R^- \mu^+$	0.110	0.109	0.110
				$\tilde{\mu}_R^+ \mu^-$	0.110	0.109	0.110
				$\tilde{\tau}_1^- \tau^+$	0.108	0.107	0.082
				$\tilde{\tau}_1^+ \tau^-$	0.108	0.107	0.082
				$\tilde{\tau}_2^- \tau^+$	0.042	0.042	0.062
				$\tilde{\tau}_2^+ \tau^-$	0.042	0.042	0.062
$\tilde{\chi}_3^0$	874.4	872.9	873.0	$\tilde{\chi}_1^+ W^-$	0.304	0.292	0.302
				$\tilde{\chi}_1^- W^+$	0.304	0.292	0.302
				$\tilde{\chi}_1^0 Z^0$	0.181	0.221	0.230
				$\tilde{\chi}_2^0 Z^0$	0.057	0.067	0.069
				$\tilde{\chi}_1^0 h^0$	0.115	0.097	0.067
$\tilde{\chi}_4^0$	876.0	878.9	879.0	$\tilde{\chi}_1^+ W^-$	0.296	0.322	0.291
				$\tilde{\chi}_1^- W^+$	0.296	0.322	0.291
				$\tilde{\chi}_1^0 Z^0$	0.118	0.075	0.068
				$\tilde{\chi}_1^0 h^0$	0.171	0.158	0.219
				$\tilde{\chi}_2^0 h^0$	0.054	0.049	0.064

Table 2: Neutralino masses (GeV) and significant branching ratios ($> 3\%$) from Isajet (I), Susygen (S) and Pythia (P)

particle	m_I	m_S	m_P	decay	$\mathcal{B}_I$	$\mathcal{B}_S$	$\mathcal{B}_P$
$\tilde{\chi}_1^+$	175.7	172.5	175.7	$\tilde{\chi}_1^0 \pi^+$	0.960		
				$\tilde{\chi}_1^0 \nu_e e^+$		1.000	0.500
				$\tilde{\chi}_1^0 \nu_\mu \mu^+$			0.500
$\tilde{\chi}_2^+$	877.2	877.9	878.0	$\tilde{\chi}_1^0 W^+$	0.300	0.416	0.298
				$\tilde{\chi}_2^0 W^+$	0.066	0.112	0.079
				$\tilde{\chi}_1^+ Z^0$	0.298	0.421	0.293
				$\tilde{\chi}_1^+ h^0$	0.286		0.283

Table 3: Chargino masses (GeV) and significant branching ratios ($> 3\%$) from Isajet (I), Susygen (S) and Pythia (P)

particle	m_I	m_S	m_P	decay	$\mathcal{B}_I$	$\mathcal{B}_S$	$\mathcal{B}_P$
h^0	114.8	114.8	113.3	$\tau^-\tau^+$	0.050	0.071	0.065
				$b\bar{b}$	0.827	0.824	0.783
				$c\bar{c}$	0.040		0.048
				gg	0.030	0.051	0.038
				W^+W^-		0.032	0.054
H^0	912.6	912.6	911.4	$\tau^-\tau^+$	0.055	0.089	0.092
				$b\bar{b}$	0.680	0.808	0.726
				$t\bar{t}$	0.133	0.057	0.178
				$\tilde{\chi}_1^+\tilde{\chi}_1^-$	0.030		
A^0	911.7	911.7	911.1	$\tau^-\tau^+$	0.054	0.081	0.090
				$b\bar{b}$	0.670	0.735	0.713
				$t\bar{t}$	0.143	0.147	0.195
				$\tilde{\tau}_1^-\tilde{\tau}_1^+$	0.030		
				$\tilde{\chi}_1^+\tilde{\chi}_1^-$		0.033	
H^+	915.8	915.8	915.3	$\nu_\tau\tau^+$	0.064	0.097	0.086
				$t\bar{b}$	0.826	0.873	0.913
				$\tilde{\tau}_1^+\tilde{\nu}_\tau$	0.066		

Table 4: Higgs masses (GeV) and significant branching ratios (> 3%) from Isajet (I), Susygen (S) and Pythia (P)

particle	m_I	m_S	m_P	decay	$\mathcal{B}_I$	$\mathcal{B}_S$	$\mathcal{B}_P$
$\tilde{t}_1$	1005.2	1005.2	1005.5	$\tilde{\chi}_1^0 t$	0.095	0.116	0.129
				$\tilde{\chi}_2^0 t$	0.341	0.291	0.302
				$\tilde{\chi}_1^+ b$	0.205	0.259	0.280
				$\tilde{\chi}_2^+ b$	0.359	0.334	0.289
$\tilde{t}_2$	1128.8	1128.8	1132.0	$\tilde{\chi}_1^+ b$	0.558	0.442	0.545
				$\tilde{\chi}_2^+ b$		0.184	
				$\tilde{\chi}_1^0 t$	0.262	0.198	0.256
				$\tilde{\chi}_3^0 t$	0.088	0.082	0.054
				$\tilde{\chi}_4^0 t$	0.042	0.087	0.103
$\tilde{b}_1$	1112.1	1112.1	1112.5	$\tilde{\chi}_1^0 b$	0.301	0.333	0.297
				$\tilde{\chi}_1^- t$	0.565	0.624	0.556
				$\tilde{\chi}_2^- t$	0.114		0.133
$\tilde{b}_2$	1232.9	1232.9	1233.2	$\tilde{\chi}_1^0 b$			0.063
				$\tilde{\chi}_2^0 b$	0.434	0.303	0.690
				$\tilde{\chi}_3^0 b$	0.097	0.182	
				$\tilde{\chi}_4^0 b$	0.098	0.181	
				$\tilde{\chi}_1^- t$			0.119
				$\tilde{\chi}_2^- t$	0.256	0.324	0.061
				$\tilde{t}_1 W^-$			0.037

Table 5: Light squark masses (GeV) and significant branching ratios (> 3%) from Isajet (I), Susygen (S) and Pythia (P)