Supersymmetric Spectrum Evaluation

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1 Comparison

We provide a comparison of results between different programs on the Snowmass DPF points for mSUGRA scenario at LHC in the tables A.1 to A.4, for a higher $\tan\beta$ scenario in table C.4 and a lower $\tan\beta$ scenario in table C.6. In these tables, all the masses are expressed in GeV, except $\Lambda_{\rm GUT}$ which is given in 10^{16} GeV; "low" means low scale: either M_Z or the convention of the program under check (for instance, `SuSpect` runs down to a low scale of 433 GeV (user's input) and `MUSE` runs down to M_Z).

Much care is needed when comparing these results, for they do not have exactly the same meaning in the different programs. For instance $\alpha_{\rm s}$(low) is given in the underlying $\overline{\rm DR}$ scheme for all the programs but `MUSE`, which is translating the value in the usual $\overline{\rm MS}$ scheme. This is true of $\sin^2\hat{\theta}_W$ also. The approximations in different programs are not the same either: which β functions are two-loops, on which one threshold effects are applied, and what thresholds are considered.

To show the influence of various set of approximations, we compare the results of different programs and / or configurations:

One expect a good agreement of `Spythia` at low $\tan\beta$ and `MUSE-1`, the discrepancies being related to usage of threshold. The agreement should be good also between `MUSE-2'`, `Isajet` and `SuSpect`, all of which are using the same approximation for β functions: one-loop thresholds and two-loops beta functions for the gauge couplings. Finally, `MUSE-2` teaches us that the supposedly small contribution of two-loops β functions for soft breaking term is bigger than the discrepancy between the different programs.

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	MUSE-1	MUSE-2	MUSE-2 +FeynHiggs	MUSE-2E	MUSE-2'	Isajet (7.42)	SuSpect (1.1)	Spythia (6.125)
loops (gauge's β)	1	2	2	2	2	2	2	1
loops (Yukawa's β)	1	2	2	1	1	1	1	1
loops (soft breaking's β)	1	2	2	1	1	1	1	1
thresholds	yes	yes	yes	yes	yes	yes	yes	no
unification	exact	exact	exact	exact	exact	"exact"	approx	exact
$\hat{\alpha}_s(M_Z)$ from unification	yes	yes	yes	yes	yes	yes	yes	no
Higgs routine	CQW	CQW	FH	CQW	CQW		CQWs	CQWp
Λ_{EWSB}	M_Z	M_Z	M_Z	Λ_E	M_Z	Λ_E	low	

CQW=Carena, Quirós, Wagner, CQWs=SuSpect version, CQWp=Pythia version, FH=FeynHiggs
$\Lambda_E = \sqrt{m_{\tilde{t}_1} m_{\tilde{t}_2}}$

Table 1
Configurations

The electroweak-only depending masses are in rather good agreement. This is particularly the case for the sleptons, on which the running has a negligible effect, which in turns hides the discrepancy on boundary conditions between the programs. The light neutralinos and the light chargino correspond well also. The lighter Higgs is known for being strongly affected by radiative corrections, but as most program uses the routine by Carena *et al.* the results are also similar. The FeynHiggs routine is in general in good agreement with the routine by Carena *et al.* (except on two point were the FeynHiggs warns about numerical unstabilities before returning a meaningless value for the heaviest CP-even Higgs). As for the difference between their heavier counterparts, it can be traced to the variations of μ, the evaluation of which depends on other parts of the spectrum, and in particular, the scalar tops.

The two remaining sectors (squarks and gluino) offer much more diversity. It is related to a large sensitivity of these masses to the running (which in turn exhibit the various implementation of boundary conditions) and to the value of α_s. A further aspect is the inclusion of finite part of the self-energies in evaluating the pole masses. First of all, the agreement between MUSE-2'' and Isajet is good for $\tilde{d}$, $\tilde{u}$ and $\tilde{b}$. The differences that appear for $\tilde{t}$ and $\tilde{g}$ are easily explained by the inclusion of finite parts for self-energy in MUSE (which are only partially taken into account in Isajet). As for SuSpect, the difference comes from the fact that the low-scale is an user-input, and consequently the results will disagree if the low-scale is not chosen to fit the average squark mass.

As for $\sin^2\theta_W$, one must not be too alarmed by the rather high values issued by MUSE. In the MSSM, $\sin^2\theta_W|_{\overline{\rm DR}}$ is quite different from the effective $\sin^2\theta_W|_{\rm eff} \sim 0.2315$ which is measured at LEP and SLD, as explained in . The conversion to the effective angle should be provided in a coming version of MUSE.

2 Conclusion

This program has been designed from start to be quick and flexible. The accuracy control is enforced at each level, and machine level accuracy is easily reached.

The comparison between different spectrum evaluators has shown that the overall results are compatible. But the precise comparison appears difficult due to the differing approximations and assumptions. The equations are sometimes expressed with different sets of variables: trilinear parameter (a) or rescaled trilinear parameter ($A = a/y$ with y being the corresponding Yukawa's coupling); ($\ln|\mu|$, $\ln|M_1|$, $\ln|M_2|$, $\ln|M_3|$) or (μ, M_1, M_2, M_3). Sometimes redundant variables are provided, like the vacuum expectation values. The lower boundary condition is not necessarily M_Z, and exact unification is not always imposed in other generators. The way the thresholds are implemented also differs.

The sign convention (μ, $\tan\alpha$, $\tan\beta$, trilinear couplings) can also be a problem for interfacing with events generators. The lack of a common standard for input of SUSY spectrum in events generators is in itself another real difficulty.

The good results in speed and accuracy leave room for improvement of the approximations in the next release. Either on the technical side (using more recent and efficient libraries, like `LAPACK` and `MINPACK-2`) but also more physics will be included, with a larger number of two-points functions and extra scales (m_τ for instance). A better treatment of off-the-road points is also expected, through an alternative expression of the constraints.

A DPF

	MUSE-1	MUSE-2	FeynHiggs	MUSE-2E	MUSE-2'	Isajet	SuSpect	Spythia
μ(low)	-488.7	-478.1		-477.6	-483.5	-517.3	-504.9	-518.9
α(low)	0.00770	0.00770		0.00770	0.00770	0.00783	0.00782	0.00776
α_s(low)(DR)	0.1040	0.1132		0.1127	0.1127			
α_s(low)(MS)	0.1177	0.1299		0.1296	0.1295	0.1327	0.1200	0.1313
$\Lambda_{\rm GUT}/10^{16}$	1.5049	2.3908		2.3394	2.3375	2.1752	2.7465	2.0916
$\alpha_{\rm GUT}$	0.03951	0.04114		0.04109	0.04109	0.04059	0.04174	0.04100
$\sin^2\theta_W$	0.2346	0.2345		0.2346	0.2346	0.2305	0.2315	0.2320
$A_{\rm top}$(low)	-339.2	-379.3		-398.4	-398.2	-342.7	-368.2	-340.0
$\tilde{l}_1$	408.9	408.8		409.0	409.0	408.8	408.8	408.8
$\tilde{l}_2$	426.9	426.1		427.8	427.8	425.9	426.4	426.8
$\tilde{\nu}$	422.4	421.6		423.3	423.3	421.4	421.9	422.2
$\tilde{\tau}_1$	408.7	408.6		408.8	408.8	408.4	408.4	408.8
$\tilde{\tau}_2$	426.8	426.1		427.8	427.8	426.1	426.4	426.8
$\tilde{\nu}_\tau$	422.3	421.5		423.2	423.2	421.3		422.2
$\tilde{\chi}_1^0$	87.1	81.0		84.9	84.9	86.0	85.6	84.4
$\tilde{\chi}_2^0$	173.1	158.6		172.1	172.0	175.7	172.5	169.9
$\tilde{\chi}_3^0$	500.5	489.6		488.7	494.7	519.6	507.1	521.2
$\tilde{\chi}_4^0$	509.4	499.0		497.8	503.8	528.4	516.3	530.0
$\tilde{\chi}_1^\pm$	173.1	158.5		172.1	172.1	175.6	172.3	169.9
$\tilde{\chi}_2^\pm$	508.6	498.1		496.9	502.9	527.4	515.3	529.1
h^0	78.5	79.1	78.8	79.6	79.6	79.7	77.3	78.0
H^0	735.2	723.8	723.3	708.0	728.9	751.1	744.3	748.7
A^0	730.9	719.4		703.5	724.5	746.4	740.0	743.7
$H^\pm$	735.2	723.7		707.8	728.8	750.8	744.1	751.4
$\tilde{u}_1$	574.7	588.4		597.7	597.7	597.8	608.9	585.7
$\tilde{u}_2$	587.3	600.2		610.2	610.1	610.2	621.4	597.4
$\tilde{d}_1$	574.0	587.7		597.0	596.9	597.1	608.1	585.0
$\tilde{d}_2$	590.4	603.3		613.2	613.1	613.4	624.4	600.4
$\tilde{t}_1$	412.0	438.7		447.9	448.2	410.8	429.2	408.5
$\tilde{t}_2$	541.4	564.2		575.7	575.4	540.3	557.4	530.1
$\tilde{b}_1$	496.3	514.7		525.2	525.2	517.9	532.8	506.3
$\tilde{b}_2$	574.0	587.7		597.0	596.9	596.9	607.9	584.8
$\tilde{g}$	522.4	532.5		556.7	556.6	553.8	524.3	547.7
accuracy	0.0000	0.0000		0.0000	0.0000			

Table A.1
DPF1: $m_0 = 400 \quad M_{\frac{1}{2}} = 200 \quad A_0 = 0 \quad \tan\beta = 2. \quad \mathrm{sgn}(\mu) = -$

	MUSE-1	MUSE-2	FeynHiggs	MUSE-2E	MUSE-2'	Isajet	SuSpect	Spythia
μ(low)	−510.4	−525.8		−524.6	−537.7	−554.9	−561.5	−577.5
α(low)	0.00771	0.00771		0.00770	0.00770	0.00782	0.00782	0.00776
α_s(low)(DR)	0.1021	0.1106		0.1101	0.1101			
α_s(low)(MS)	0.1171	0.1288		0.1285	0.1284	0.1341	0.1200	0.1313
$\Lambda_{\rm GUT}/10^{16}$	1.2494	1.9647		1.9234	1.9203	1.9207	2.7465	2.0916
$\alpha_{\rm GUT}$	0.03936	0.04094		0.04089	0.04088	0.04023	0.04174	0.04100
$\sin^2\theta_W$	0.2353	0.2352		0.2354	0.2354	0.2302	0.2315	0.2320
$A_{\rm top}$(low)	−502.6	−558.4		−585.7	−585.2	−500.5	−552.2	−510.0
$\tilde{l}_1$	157.3	156.9		157.9	157.9	157.0	156.8	157.0
$\tilde{l}_2$	241.7	238.6		245.3	245.3	238.6	239.4	241.1
$\tilde{\nu}$	233.6	230.4		237.4	237.4	230.4	231.5	232.9
$\tilde{\tau}_1$	157.1	156.7		157.8	157.8	156.6	156.5	157.0
$\tilde{\tau}_2$	241.7	238.5		245.3	245.3	238.7	239.6	241.1
$\tilde{\nu}_\tau$	233.6	230.3		237.3	237.3	230.4		232.9
$\tilde{\chi}_1^0$	130.8	121.6		127.4	127.4	128.5	127.0	125.2
$\tilde{\chi}_2^0$	255.4	234.3		253.9	253.9	257.6	253.5	249.9
$\tilde{\chi}_3^0$	523.0	538.6		537.0	550.3	557.5	563.8	579.9
$\tilde{\chi}_4^0$	530.0	546.0		544.0	557.3	564.5	571.1	586.9
$\tilde{\chi}_1^\pm$	255.5	234.4		254.0	254.0	257.6	253.5	249.9
$\tilde{\chi}_2^\pm$	529.9	545.6		543.8	557.0	564.1	570.6	586.4
h^0	83.4	83.8	81.7	84.4	84.4	83.9	82.1	82.1
H^0	631.2	642.5	642.2	627.1	656.3	676.6	683.4	698.0
A^0	626.0	637.4		621.8	651.2	671.2	678.5	693.1
$H^\pm$	630.8	642.1		626.7	655.9	676.1	682.9	700.0
$\tilde{u}_1$	615.5	640.7		657.8	657.5	661.7	696.5	641.8
$\tilde{u}_2$	642.2	665.5		683.6	683.3	683.9	721.8	665.5
$\tilde{d}_1$	612.9	638.2		655.3	655.0	659.3	694.0	639.5
$\tilde{d}_2$	645.1	668.3		686.3	686.0	686.7	724.4	668.0
$\tilde{t}_1$	518.3	540.3		553.8	554.5	534.1	560.1	511.8
$\tilde{t}_2$	641.3	671.7		690.6	689.5	648.5	685.2	627.8
$\tilde{b}_1$	584.8	608.0		625.3	625.1	623.8	657.1	600.0
$\tilde{b}_2$	613.5	638.8		655.8	655.6	659.1	693.8	639.6
$\tilde{g}$	726.1	737.8		770.9	770.6	764.3	786.4	753.6
accuracy	0.0000	0.0000		0.0000	0.0000			

Table A.2
DPF2: $m_0 = 100 \quad M_{\frac{1}{2}} = 300 \quad A_0 = 0 \quad \tan\beta = 2. \quad \mathrm{sgn}(\mu) = -$

	MUSE-1	MUSE-2	FeynHiggs	MUSE-2E	MUSE-2'	Isajet	SuSpect	Spythia
μ(low)	-248.6	-243.9		-245.5	-247.4	-265.1	-253.7	-253.4
α(low)	0.00775	0.00775		0.00775	0.00775	0.00782	0.00782	0.00776
α_s(low)(DR)	0.1102	0.1210		0.1204	0.1204			
α_s(low)(MS)	0.1198	0.1329		0.1326	0.1325	0.1362	0.1200	0.1313
$\Lambda_{\rm GUT}/10^{16}$	1.8010	2.9069		2.8356	2.8347	2.4926	2.7465	2.0916
$\alpha_{\rm GUT}$	0.04023	0.04200		0.04194	0.04194	0.04161	0.04174	0.04100
$\sin^2\theta_W$	0.2329	0.2328		0.2329	0.2329	0.2303	0.2315	0.2320
$A_{\rm top}$(low)	-178.2	-201.9		-212.7	-212.7	-184.0	-184.1	-170.0
$\tilde{l}_1$	206.5	206.5		206.6	206.6	206.5	206.3	206.5
$\tilde{l}_2$	215.8	215.4		216.3	216.3	215.7	215.5	215.7
$\tilde{\nu}$	206.7	206.3		207.2	207.2	206.6	206.7	206.5
$\tilde{\tau}_1$	206.4	206.4		206.5	206.5	206.1	205.9	206.5
$\tilde{\tau}_2$	215.8	215.4		216.2	216.2	216.0	215.8	215.7
$\tilde{\nu}_\tau$	206.7	206.3		207.2	207.2	206.6		206.5
$\tilde{\chi}_1^0$	45.3	42.0		44.2	44.2	44.5	45.0	44.5
$\tilde{\chi}_2^0$	96.1	88.8		95.6	95.5	97.0	96.6	95.0
$\tilde{\chi}_3^0$	256.7	251.9		253.5	255.4	269.8	258.2	258.3
$\tilde{\chi}_4^0$	273.6	269.6		270.6	272.4	286.1	275.5	275.1
$\tilde{\chi}_1^\pm$	95.6	88.1		95.1	95.0	96.4	95.9	94.5
$\tilde{\chi}_2^\pm$	272.2	268.0		269.1	271.0	284.4	273.7	273.6
h^0	67.5	68.4	68.2	69.0	69.0	68.6	65.9	68.2
H^0	373.7	368.6	369.4	364.6	371.9	384.9	377.8	372.1
A^0	365.4	360.0		355.9	363.4	376.7	369.5	365.9
$H^\pm$	374.0	368.8		364.8	372.1	384.6	377.9	373.5
$\tilde{u}_1$	298.7	307.3		313.3	313.3	312.5	303.6	308.1
$\tilde{u}_2$	303.8	312.0		318.4	318.4	317.6	308.7	312.6
$\tilde{d}_1$	299.7	308.3		314.2	314.2	313.6	304.5	309.1
$\tilde{d}_2$	309.9	318.0		324.2	324.2	323.5	314.7	318.2
$\tilde{t}_1$	259.2	265.6		269.1	269.4	258.2	254.3	264.6
$\tilde{t}_2$	321.9	338.6		346.2	345.9	319.9	314.9	316.8
$\tilde{b}_1$	262.7	273.4		279.9	279.9	275.1	269.2	274.8
$\tilde{b}_2$	299.8	308.3		314.3	314.3	313.5	304.4	309.1
$\tilde{g}$	281.4	288.0		302.6	302.6	300.2	262.1	298.9
accuracy	0.0000	0.0000		0.0000	0.0000			

Table A.3
DPF3: $m_0 = 200 \quad M_{\frac{1}{2}} = 100 \quad A_0 = 0 \quad \tan\beta = 2. \quad \mathrm{sgn}(\mu) = -$

	MUSE-1	MUSE-2	FeynHiggs	MUSE-2E	MUSE-2'	Isajet	SuSpect Spythia
μ(low)	439.9	463.1		450.9	468.0	442.9	430.1
α(low)	0.00772	0.00772		0.00772	0.00772	0.00782	0.00776
α_s(low)(DR)	0.1071	0.1171		0.1166	0.1165		
α_s(low)(MS)	0.1191	0.1318		0.1314	0.1313	0.1373	0.1313
$\Lambda_{\rm GUT}/10^{16}$	1.6719	2.6832		2.6163	2.6075	2.4926	2.0916
$\alpha_{\rm GUT}$	0.03987	0.04159		0.04154	0.04153	0.04103	0.04100
$\sin^2\theta_W$	0.2337	0.2336		0.2338	0.2338	0.2299	0.2320
$A_{\rm top}$(low)	-349.7	-424.7		-437.3	-437.3	-323.2	-296.0
$\tilde{l}_1$	307.5	307.5		307.6	307.6	307.5	307.5
$\tilde{l}_2$	321.1	320.8		321.8	321.8	320.7	321.0
$\tilde{\nu}$	315.1	314.7		315.8	315.8	314.7	314.9
$\tilde{\tau}_1$	306.8	306.8		306.9	306.9	305.8	307.5
$\tilde{\tau}_2$	321.2	320.9		321.9	321.9	321.8	321.0
$\tilde{\nu}_\tau$	314.9	314.5		315.6	315.6	314.5	314.9
$\tilde{\chi}_1^0$	58.0	54.1		56.5	56.7	57.0	56.2
$\tilde{\chi}_2^0$	109.9	100.6		109.5	110.1	111.7	107.4
$\tilde{\chi}_3^0$	448.9	472.7		459.8	477.2	444.5	431.6
$\tilde{\chi}_4^0$	468.4	490.5		478.5	495.2	464.3	452.0
$\tilde{\chi}_1^\pm$	108.1	99.0		107.9	108.6	110.4	105.7
$\tilde{\chi}_2^\pm$	465.6	487.9		475.9	492.6	461.3	449.1
h^0	92.2	93.7	102.8	93.8	94.1	93.5	87.8
H^0	634.1	657.5	671.0	632.7	663.9	611.7	598.5
A^0	630.9	654.6		629.4	660.9	607.8	594.7
$H^\pm$	635.8	659.3		634.3	665.6	612.9	600.2
$\tilde{u}_1$	438.9	451.7		458.3	458.2	459.8	448.4
$\tilde{u}_2$	447.9	460.2		467.2	467.1	466.8	456.6
$\tilde{d}_1$	438.9	451.7		458.3	458.1	459.9	448.5
$\tilde{d}_2$	452.0	464.1		471.2	471.0	470.9	460.4
$\tilde{t}_1$	170.4	158.6		169.5	166.7	188.1	210.4
$\tilde{t}_2$	489.9	509.7		515.9	517.3	481.3	474.6
$\tilde{b}_1$	365.0	375.0		382.6	382.4	386.4	381.8
$\tilde{b}_2$	439.2	452.0		458.6	458.4	460.1	448.0
$\tilde{g}$	399.6	410.2		428.1	427.8	431.3	425.0
accuracy	0.0000	0.0000		0.0000	0.0000		

Table A.4
DPF5: $m_0 = 300 \quad M_{\frac{1}{2}} = 150 \quad A_0 = -600 \quad \tan\beta = 2. \quad \mathrm{sgn}(\mu) = +$

	MUSE-1	MUSE-2	FeynHiggs	MUSE-2E	MUSE-2'	Isajet	SuSpect	Spythia
μ(low)	−33.2	−29.6		−32.2	−32.7	−37.9	−22.2	−29.0
α(low)	0.00783	0.00783		0.00783	0.00783	0.00782	0.00782	0.00776
α_s(low)(DR)	0.1212	0.1352		0.1346	0.1346			
α_s(low)(MS)	0.1222	0.1368		0.1367	0.1367	0.1311	0.1200	0.1313
$\Lambda_{\rm GUT}/10^{16}$	2.4004	3.9746		3.8955	3.8926	2.8564	2.7465	2.0916
$\alpha_{\rm GUT}$	0.04136	0.04341		0.04337	0.04337	0.04292	0.04178	0.04100
$\sin^2\theta_W$	0.2302	0.2302		0.2303	0.2303	0.2311	0.2315	0.2320
$A_{\rm top}$(low)	−61.2	−70.1		−74.5	−74.5	−65.9	−56.5	−52.4
$\tilde{l}_1$	78.1	78.1		78.1	78.1	78.1	77.6	78.2
$\tilde{l}_2$	81.5	81.4		81.6	81.6	81.6	81.5	81.4
$\tilde{\nu}$	46.2	46.1		46.4	46.4	46.4	46.8	45.6
$\tilde{\tau}_1$	78.1	78.0		78.1	78.1	77.9	77.6	78.2
$\tilde{\tau}_2$	81.5	81.4		81.6	81.6	81.7	81.5	81.4
$\tilde{\nu}_\tau$	46.2	46.0		46.4	46.4	46.3		45.6
$\tilde{\chi}_1^0$	14.4	13.0		14.0	14.0	14.2	14.3	14.4
$\tilde{\chi}_2^0$	23.6	21.0		22.9	23.2	26.6	16.6	20.8
$\tilde{\chi}_3^0$	96.7	95.7		96.6	96.6	95.5	91.9	95.7
$\tilde{\chi}_4^0$	99.0	97.7		98.5	98.7	100.9	97.0	96.1
$\tilde{\chi}_1^\pm$	49.1	48.1		49.0	49.0	48.8	48.4	48.2
$\tilde{\chi}_2^\pm$	111.8	110.7		111.5	111.6	111.3	107.9	109.6
h^0	38.9	38.0	40.4	38.7	39.2	39.6	36.3	38.9
H^0	105.4	104.8	103.3	105.4	105.7	102.8	102.8	103.9
A^0	60.1	57.6		58.8	59.8	65.6	56.6	58.9
$H^\pm$	101.3	99.8		100.5	101.1	101.6	98.2	99.3
$\tilde{u}_1$	92.2	95.9		99.0	99.0	100.5	90.7	102.1
$\tilde{u}_2$	96.4	100.1		102.9	102.9	96.6	86.1	98.6
$\tilde{d}_1$	102.7	106.0		108.6	108.6	106.8	97.2	107.8
$\tilde{d}_2$	114.1	117.0		119.5	119.5	117.6	108.9	117.6
$\tilde{t}_1$	154.5	150.3		150.4	150.5	168.6	154.9	162.8
$\tilde{t}_2$	217.0	223.2		225.4	225.3	216.0	199.5	199.6
$\tilde{b}_1$	100.5	104.0		106.5	106.5	103.9	96.1	106.7
$\tilde{b}_2$	102.9	106.4		109.0	109.0	106.8	97.3	108.7
$\tilde{g}$	94.9	98.1		104.7	104.7	100.4	76.0	167.4
accuracy	0.0000	0.0000		0.0000	0.0000			

Table B.1
ACP1: $m_0 = 68 \quad M_{\frac{1}{2}} = 29 \quad A_0 = 0 \quad \tan\beta = 2. \quad \mathrm{sgn}(\mu) = -$

B ACP

	MUSE-1	MUSE-2	FeynHiggs	MUSE-2E	MUSE-2'	Isajet	SuSpect	Spythia
μ(low)	-736.3	-759.8		-751.1	-770.2	-805.1	-829.2	-887.3
α(low)	0.00767	0.00767		0.00767	0.00767	0.00783	0.00782	0.00776
α_s(low)(DR)	0.0978	0.1058		0.1052	0.1051			
α_s(low)(MS)	0.1144	0.1258		0.1253	0.1251	0.1283	0.1200	0.1313
$\Lambda_{\rm GUT}/10^{16}$	1.0031	1.6348		1.5762	1.5591	1.5891	2.7465	2.0916
$\alpha_{\rm GUT}$	0.03843	0.04007		0.03996	0.03992	0.03969	0.04174	0.04100
$\sin^2\theta_W$	0.2363	0.2362		0.2363	0.2363	0.2310	0.2315	0.2320
$A_{\rm top}$(low)	-701.8	-783.6		-814.4	-811.0	-710.9	-828.3	-765.0
$\tilde{l}_1$	306.9	306.5		307.7	307.7	306.1	306.6	306.6
$\tilde{l}_2$	412.0	407.9		416.8	416.8	404.5	409.1	411.3
$\tilde{\nu}$	407.4	403.1		412.2	412.2	399.7	404.5	406.5
$\tilde{\tau}_1$	306.7	306.3		307.4	307.4	305.8	306.3	306.6
$\tilde{\tau}_2$	412.0	407.8		416.7	416.7	404.5	409.1	411.3
$\tilde{\nu}_\tau$	407.3	403.1		412.1	412.1	399.7		406.5
$\tilde{\chi}_1^0$	199.3	185.7		194.0	194.1	194.8	189.0	186.2
$\tilde{\chi}_2^0$	381.7	351.7		379.3	379.3	383.8	375.8	370.6
$\tilde{\chi}_3^0$	754.3	778.5		768.8	788.4	806.9	830.7	888.8
$\tilde{\chi}_4^0$	759.0	783.5		773.5	793.0	811.7	835.7	893.5
$\tilde{\chi}_1^\pm$	381.8	351.8		379.4	379.4	383.8	375.8	370.7
$\tilde{\chi}_2^\pm$	759.0	783.3		773.4	792.9	811.4	835.3	893.2
h^0	89.2	89.2	86.3	89.8	89.8	88.3	87.4	86.7
H^0	941.6	959.3	958.9	924.6	972.0	1008.0	1025.8	1091.3
A^0	938.1	955.9		921.0	968.6	1003.9	1022.4	1082.5
$H^\pm$	941.2	959.0		924.2	971.7	1007.6	1025.4	1093.3
$\tilde{u}_1$	887.8	926.8		944.9	943.0	960.7	1064.1	935.6
$\tilde{u}_2$	928.4	964.8		984.5	982.6	996.1	1102.0	973.0
$\tilde{d}_1$	883.0	922.2		940.4	938.5	956.1	1059.8	931.3
$\tilde{d}_2$	930.5	966.7		986.4	984.6	998.0	1103.7	974.7
$\tilde{t}_1$	721.7	763.2		778.8	777.8	753.1	833.7	698.1
$\tilde{t}_2$	889.8	933.9		954.3	951.7	919.5	1015.1	878.8
$\tilde{b}_1$	837.4	874.1		893.3	891.6	903.7	996.1	859.6
$\tilde{b}_2$	883.7	922.9		941.1	939.2	955.8	1059.5	931.4
$\tilde{g}$	1030.6	1052.7		1092.1	1090.0	1095.4	1179.6	1083.2
accuracy	0.0000	0.0000		0.0000	0.0000			

Table B.2
ACP2: $m_0 = 250 \quad M_{\frac{1}{2}} = 450 \quad A_0 = 0 \quad \tan\beta = 2. \quad \mathrm{sgn}(\mu) = -$

	MUSE-1	MUSE-2	FeynHiggs	MUSE-2E	MUSE-2'	Isajet	SuSpect	Spythia
μ(low)	-1637.3	-1613.8		-1830.5	-1689.6	-1804.2	-1819.1	-2129.3
α(low)	0.00714	0.00760		0.00671	0.00583	0.00783	0.00782	0.00776
α_s(low)(DR)	0.0898	0.0961		0.0959	0.0817			
α_s(low)(MS)	0.1092	0.1185		0.1192	0.0981	0.1263	0.1200	0.1313
$\Lambda_{\rm GUT}/10^{16}$	9.1754	0.9971		240.7856	********	1.2613	2.7465	2.0916
$\alpha_{\rm GUT}$	0.03501	0.03796		0.03450	0.02993	0.03883	0.04174	0.04100
$\sin^2\theta_W$	0.2360	0.2381		0.2338	0.2344	0.2308	0.2315	0.2320
$A_{\rm top}$(low)	-1428.5	-1489.9		-1599.9	-1580.4	-1451.1	-1840.8	-1700.0
$\tilde{l}_1$	1120.1	1119.5		1121.0	1121.0	1117.6	1119.7	1119.7
$\tilde{l}_2$	1275.5	1268.9		1283.2	1283.2	1254.1	1270.8	1274.3
$\tilde{\nu}$	1274.0	1267.4		1281.7	1281.7	1252.6	1269.3	1272.8
$\tilde{\tau}_1$	1119.5	1118.8		1120.4	1120.4	1117.1	1119.1	1119.7
$\tilde{\tau}_2$	1275.3	1268.6		1282.9	1282.9	1253.9	1270.6	1274.3
$\tilde{\nu}_\tau$	1273.8	1267.1		1281.4	1281.4	1252.3		1272.8
$\tilde{\chi}_1^0$	452.7	436.4		433.6	433.6	444.9	417.6	411.5
$\tilde{\chi}_2^0$	848.8	798.5		839.3	838.8	856.8	828.8	817.7
$\tilde{\chi}_3^0$	1683.9	1657.9		1889.3	1736.2	1805.0	1819.8	2129.9
$\tilde{\chi}_4^0$	1686.0	1660.1		1891.4	1738.3	1807.2	1822.0	2131.9
$\tilde{\chi}_1^\pm$	848.8	798.5		839.3	838.8	856.8	828.8	817.7
$\tilde{\chi}_2^\pm$	1686.0	1660.0		1891.2	1738.2	1807.1	1821.9	2131.7
h^0	99.6	98.6	93.3	99.4	102.3	94.5	94.8	93.6
H^0	2297.2	2291.2	120.0	2560.3	2281.8	2457.4	2427.9	2770.0
A^0	2295.7	2289.7		2559.0	2280.2	2454.3	2426.4	2730.5
$H^\pm$	2297.0	2290.9		2560.1	2281.4	2457.2	2427.6	2773.0
$\tilde{u}_1$	2053.2	2022.7		2236.6	2256.2	2162.1	2527.4	2081.0
$\tilde{u}_2$	2137.5	2103.6		2319.0	2338.5	2235.6	2607.3	2166.4
$\tilde{d}_1$	2042.1	2011.5		2226.1	2245.8	2151.1	2517.7	2070.1
$\tilde{d}_2$	2138.5	2104.6		2320.0	2339.4	2236.4	2608.0	2167.4
$\tilde{t}_1$	1507.4	1533.1		1662.8	1662.9	1563.6	1874.9	1307.2
$\tilde{t}_2$	1938.9	1930.6		2111.8	2117.6	1978.9	2322.0	1827.3
$\tilde{b}_1$	1869.8	1856.7		2032.9	2047.9	1973.1	2314.1	1819.1
$\tilde{b}_2$	2042.6	2012.2		2226.6	2245.9	2150.4	2516.9	2069.5
$\tilde{g}$	2184.2	2119.5		2393.2	2406.3	2303.8	2621.4	2239.6
accuracy	0.0835	0.0001		0.1103	0.2952			

Table B.3
ACP3: $m_0 = 1050 \quad M_{\frac{1}{2}} = 1000 \quad A_0 = 0 \quad \tan\beta = 2. \quad \mathrm{sgn}(\mu) = -$

	MUSE-1	MUSE-2	FeynHiggs	MUSE-2E	MUSE-2'	Isajet	SuSpect	Spythia
μ(low)	735.5	752.4		714.4	762.5	779.9	792.1	842.0
α(low)	0.00767	0.00767		0.00767	0.00767	0.00783	0.00782	0.00776
α_s(low)(DR)	0.0984	0.1066		0.1063	0.1059			
α_s(low)(MS)	0.1146	0.1263		0.1261	0.1256	0.1325	0.1200	0.1313
$\Lambda_{\rm GUT}/10^{16}$	1.0687	1.7573		1.7202	1.6759	1.6564	2.7465	2.0916
$\alpha_{\rm GUT}$	0.03848	0.04016		0.04011	0.04001	0.03975	0.04174	0.04100
$\sin^2\theta_W$	0.2360	0.2360		0.2360	0.2361	0.2302	0.2315	0.2320
$A_{\rm top}$(low)	-643.9	-720.8		-753.4	-746.6	-636.7	-736.3	-680.0
$\tilde{l}_1$	430.5	430.2		430.9	430.9	430.0	430.2	430.3
$\tilde{l}_2$	495.0	492.3		498.2	498.2	490.0	493.1	494.5
$\tilde{\nu}$	491.1	488.4		494.3	494.3	486.1	489.3	490.6
$\tilde{\tau}_1$	430.2	430.0		430.6	430.6	429.5	429.8	430.3
$\tilde{\tau}_2$	494.9	492.2		498.1	498.1	490.1	493.1	494.5
$\tilde{\nu}_\tau$	491.0	488.3		494.2	494.2	486.0		490.6
$\tilde{\chi}_1^0$	172.1	160.0		167.0	167.6	168.5	164.1	161.9
$\tilde{\chi}_2^0$	323.8	297.5		320.9	322.4	327.0	319.3	316.3
$\tilde{\chi}_3^0$	751.5	769.0		729.1	778.5	780.7	792.8	842.7
$\tilde{\chi}_4^0$	766.6	782.9		744.9	792.6	795.3	807.0	855.4
$\tilde{\chi}_1^\pm$	323.2	297.0		320.3	321.9	326.7	319.0	316.0
$\tilde{\chi}_2^\pm$	764.6	781.0		742.9	790.8	793.1	805.0	853.6
h^0	97.7	97.2	92.7	97.3	97.7	97.7	95.1	96.5
H^0	1065.8	1087.7	1087.9	1000.6	1102.4	1030.8	1086.1	1093.5
A^0	1063.1	1085.0		997.7	1099.8	1027.3	1083.3	1084.8
$H^\pm$	1065.9	1087.8		1000.6	1102.5	1030.9	1086.1	1091.5
$\tilde{u}_1$	860.7	894.3		912.3	908.5	923.2	1002.5	899.7
$\tilde{u}_2$	894.0	925.6		944.9	941.2	955.6	1034.3	930.8
$\tilde{d}_1$	856.9	890.7		908.7	904.9	919.6	999.1	896.2
$\tilde{d}_2$	896.0	927.6		946.9	943.1	957.6	1036.1	932.6
$\tilde{t}_1$	610.0	649.6		668.6	663.8	640.2	699.3	576.7
$\tilde{t}_2$	902.1	946.3		963.4	961.9	904.8	984.3	879.5
$\tilde{b}_1$	792.5	827.0		846.1	842.5	848.7	921.3	810.2
$\tilde{b}_2$	857.5	891.3		909.4	905.6	919.6	998.8	895.9
$\tilde{g}$	932.9	954.3		993.2	988.7	1007.1	1048.6	985.7
accuracy	0.0000	0.0000		0.0000	0.0000			

Table C.1
GDR1: $m_0 = 400 \quad M_{\frac{1}{2}} = 400 \quad A_0 = 0 \quad \tan\beta = 2. \quad \mathrm{sgn}(\mu) = +$

C GDR

	MUSE-1	MUSE-2	FeynHiggs	MUSE-2E	MUSE-2'	Isajet	SuSpect	Spythia
μ(low)	-512.2	-521.5		-508.4	-533.5	-556.4	-540.6	-581.4
α(low)	0.00768	0.00768		0.00767	0.00767	0.00782	0.00782	0.00776
α_s(low)(DR)	0.1001	0.1087		0.1082	0.1082			
α_s(low)(MS)	0.1173	0.1294		0.1291	0.1290	0.1326	0.1200	0.1313
$\Lambda_{\rm GUT}/10^{16}$	1.2532	1.9939		1.9512	1.9497	1.7143	2.7465	2.0916
$\alpha_{\rm GUT}$	0.03905	0.04071		0.04066	0.04066	0.03986	0.04182	0.04100
$\sin^2\theta_W$	0.2358	0.2357		0.2359	0.2359	0.2304	0.2315	0.2320
$A_{\rm top}$(low)	-788.1	-862.8		-905.5	-905.3	-751.4	-866.3	-815.9
$\tilde{l}_1$	431.3	431.0		431.7	431.7	430.8	431.1	431.2
$\tilde{l}_2$	495.9	492.9		499.1	499.1	491.0	494.1	495.4
$\tilde{\nu}$	489.5	486.5		492.8	492.8	484.6	487.6	488.9
$\tilde{\tau}_1$	426.7	426.2		426.9	426.9	424.9	425.1	431.2
$\tilde{\tau}_2$	493.9	490.9		497.1	497.1	490.7	493.4	495.4
$\tilde{\nu}_\tau$	487.5	484.4		490.7	490.7	482.8		488.9
$\tilde{\chi}_1^0$	172.6	160.2		168.0	168.1	170.4	166.3	164.1
$\tilde{\chi}_2^0$	326.5	299.7		324.3	325.6	331.3	323.6	320.9
$\tilde{\chi}_3^0$	524.8	534.4		520.6	546.0	562.2	546.6	587.1
$\tilde{\chi}_4^0$	533.7	541.2		529.6	553.6	569.6	554.3	593.0
$\tilde{\chi}_1^\pm$	326.4	299.6		324.2	325.5	331.3	323.6	320.9
$\tilde{\chi}_2^\pm$	536.1	543.8		532.0	556.0	571.8	556.6	595.4
h^0	115.3	115.1	111.5	115.6	115.5	115.7	114.3	114.2
H^0	531.9	510.1	510.1	551.1	507.0	726.6	620.2	749.5
A^0	531.5	509.7		550.8	506.6	725.8	619.9	749.2
$H^\pm$	537.1	515.6		556.2	512.5	730.6	624.7	754.1
$\tilde{u}_1$	881.0	911.7		932.0	931.8	926.4	1003.0	899.5
$\tilde{u}_2$	913.8	942.3		964.1	963.9	958.5	1034.5	930.2
$\tilde{d}_1$	877.7	908.5		928.8	928.6	923.2	1000.0	896.3
$\tilde{d}_2$	917.1	945.5		967.1	967.0	961.8	1037.6	933.3
$\tilde{t}_1$	693.9	728.9		747.8	748.0	710.4	770.0	665.9
$\tilde{t}_2$	913.1	954.6		977.6	977.3	901.8	980.0	877.8
$\tilde{b}_1$	824.1	855.9		877.6	877.3	865.4	937.3	830.5
$\tilde{b}_2$	870.9	902.3		922.6	922.5	917.6	993.2	891.6
$\tilde{g}$	957.7	974.4		1017.1	1017.0	1009.8	1049.4	986.7
accuracy	0.0000	0.0000		0.0000	0.0000			

Table C.2
GDR2: $m_0 = 400 \quad M_{\frac{1}{2}} = 400 \quad A_0 = 0 \quad \tan\beta = 10. \quad \mathrm{sgn}(\mu) = -$

	MUSE-1	MUSE-2	FeynHiggs	MUSE-2E	MUSE-2'	Isajet	SuSpect	Spythia
μ(low)						-533.2	-529.9	-563.8
α(low)						0.00783	0.00782	0.00776
α_s(low)(DR)								
α_s(low)(MS)						0.1336	0.1200	0.1313
$\Lambda_{\rm GUT}/10^{16}$						1.6564	2.7465	2.0916
$\alpha_{\rm GUT}$						0.03978	0.04175	0.04100
$\sin^2\theta_W$						0.2303	0.2315	0.2320
$A_{\rm top}$(low)						-723.0	-827.7	-821.2
$\tilde{l}_1$						256.4	256.7	256.8
$\tilde{l}_2$						349.1	352.2	354.2
$\tilde{\nu}$						339.8	342.9	344.9
$\tilde{\tau}_1$						171.0	169.5	256.8
$\tilde{\tau}_2$						359.0	360.2	354.2
$\tilde{\nu}_\tau$						325.0		344.9
$\tilde{\chi}_1^0$						169.5	165.7	163.5
$\tilde{\chi}_2^0$						326.8	320.5	318.1
$\tilde{\chi}_3^0$						538.5	535.2	568.9
$\tilde{\chi}_4^0$						550.2	546.7	578.3
$\tilde{\chi}_1^\pm$						326.8	320.5	318.0
$\tilde{\chi}_2^\pm$						551.5	548.2	579.9
h^0						117.3	$-nan$	116.4
H^0						387.0	$-nan$	441.5
A^0						386.8	$-nan$	441.6
$H^\pm$						397.8	$-nan$	449.9
$\tilde{u}_1$						866.0	940.3	837.9
$\tilde{u}_2$						895.1	973.8	870.3
$\tilde{d}_1$						862.5	937.1	834.7
$\tilde{d}_2$						898.7	977.1	873.6
$\tilde{t}_1$						677.8	730.3	622.3
$\tilde{t}_2$						841.1	913.5	820.7
$\tilde{b}_1$						740.6	830.1	702.9
$\tilde{b}_2$						823.0	867.5	793.4
$\tilde{g}$						997.2	1048.4	973.2
accuracy								

Table C.3
GDR3: $m_0 = 200 \quad M_{\frac{1}{2}} = 400 \quad A_0 = 0 \quad \tan\beta = 40. \quad \mathrm{sgn}(\mu) = -$

	MUSE-1	MUSE-2	FeynHiggs	MUSE-2E	MUSE-2'	Isajet	SuSpect Spythia
μ(low)	121.5	124.1		126.6	126.5	139.7	112.3
α(low)	0.00779	0.00779		0.00779	0.00779	0.00782	0.00776
α_s(low)(DR)	0.1154	0.1320		0.1269	0.1268		
α_s(low)(MS)	0.1249	0.1454		0.1395	0.1394	0.1375	0.1313
$\Lambda_{\rm GUT}/10^{16}$	2.0489	4.1208		3.2512	3.2484	2.8061	2.0916
$\alpha_{\rm GUT}$	0.04079	0.04308		0.04269	0.04269	0.04177	0.04100
$\sin^2\theta_W$	0.2316	0.2307		0.2317	0.2317	0.2309	0.2320
$A_{\rm top}$(low)	-142.9	-161.1		-167.5	-167.4	-158.4	-129.3
$\tilde{l}_1$	76.9	76.7		77.0	77.0	77.0	76.9
$\tilde{l}_2$	99.7	98.7		100.8	100.8	100.2	99.5
$\tilde{\nu}$	60.1	58.3		61.7	61.7	60.9	59.2
$\tilde{\tau}_1$	69.2	68.6		69.1	69.1	56.1	76.9
$\tilde{\tau}_2$	97.1	95.9		98.1	98.1	105.9	99.5
$\tilde{\nu}_\tau$	55.3	53.1		57.0	57.0	56.3	59.2
$\tilde{\chi}_1^0$	30.3	27.2		30.3	30.3	32.4	28.4
$\tilde{\chi}_2^0$	58.3	52.1		58.4	58.3	61.1	56.6
$\tilde{\chi}_3^0$	140.7	143.8		145.3	145.2	156.7	132.0
$\tilde{\chi}_4^0$	175.9	174.4		178.7	178.6	186.7	169.6
$\tilde{\chi}_1^\pm$	51.1	45.7		52.2	52.2	56.7	48.1
$\tilde{\chi}_2^\pm$	179.3	178.5		182.2	182.1	189.7	172.9
h^0	101.2	102.1	102.9	102.1	102.3	100.9	100.0
H^0	154.3	160.8	161.3	146.5	165.5	142.5	122.5
A^0	153.6	160.2		145.7	165.0	141.8	121.0
$H^\pm$	173.4	179.3		166.4	183.5	162.6	144.9
$\tilde{u}_1$	236.9	255.0		258.3	258.3	254.3	246.8
$\tilde{u}_2$	242.2	259.6		263.5	263.4	258.1	251.0
$\tilde{d}_1$	239.5	257.4		260.7	260.6	257.0	249.2
$\tilde{d}_2$	254.6	271.2		274.8	274.8	270.1	261.8
$\tilde{t}_1$	221.5	235.3		236.6	236.6	223.5	234.8
$\tilde{t}_2$	328.6	348.9		352.0	352.0	328.0	317.4
$\tilde{b}_1$	225.1	244.6		247.6	247.5	236.2	235.6
$\tilde{b}_2$	247.3	264.2		267.7	267.7	266.3	259.7
$\tilde{g}$	278.8	291.5		302.3	302.3	292.8	288.9
accuracy	0.0000	0.0022		0.0000	0.0000		

Table C.4
GDR4: $m_0 = 50 \quad M_{\frac{1}{2}} = 100 \quad A_0 = 300 \quad \tan\beta = 15. \quad \mathrm{sgn}(\mu) = +$

	MUSE-1	MUSE-2	FeynHiggs	MUSE-2E	MUSE-2'	Isajet	SuSpect	Spythia
μ(low)	-302.7	-258.2		-263.6	-258.6	-355.0	-288.9	-337.6
α(low)	0.00769	0.00769		0.00769	0.00769	0.00782	0.00782	0.00776
α_s(low)(DR)	0.1041	0.1139		0.1134	0.1134			
α_s(low)(MS)	0.1190	0.1322		0.1318	0.1318	0.1334	0.1200	0.1313
$\Lambda_{\rm GUT}/10^{16}$	1.5783	2.5577		2.4927	2.4949	2.3702	2.7465	2.0916
$\alpha_{\rm GUT}$	0.03948	0.04124		0.04119	0.04119	0.04092	0.04182	0.04100
$\sin^2\theta_W$	0.2346	0.2344		0.2345	0.2345	0.2308	0.2315	0.2320
$A_{\rm top}$(low)	-274.2	-291.3		-314.7	-314.8	-281.1	-268.6	-285.9
$\tilde{l}_1$	606.5	606.4		606.6	606.6	606.4	606.4	606.5
$\tilde{l}_2$	618.9	618.2		619.6	619.6	618.1	618.6	618.8
$\tilde{\nu}$	614.0	613.3		614.7	614.7	613.2	613.6	613.8
$\tilde{\tau}_1$	604.1	603.9		604.1	604.1	603.3	603.4	606.5
$\tilde{\tau}_2$	617.7	617.0		618.4	618.4	617.9	618.0	618.8
$\tilde{\nu}_\tau$	612.8	612.1		613.4	613.4	612.1		613.8
$\tilde{\chi}_1^0$	85.1	78.1		82.5	82.4	84.3	83.6	82.7
$\tilde{\chi}_2^0$	160.7	142.4		156.1	155.4	165.6	158.7	159.7
$\tilde{\chi}_3^0$	317.4	273.9		278.7	273.8	365.8	301.5	348.9
$\tilde{\chi}_4^0$	322.7	281.2		287.7	283.5	368.6	307.9	352.0
$\tilde{\chi}_1^\pm$	161.0	142.9		156.6	156.0	165.8	159.2	159.9
$\tilde{\chi}_2^\pm$	328.4	287.4		293.5	289.2	373.9	313.7	357.7
h^0	106.4	106.6	105.9	106.9	106.9	106.7	105.7	105.8
H^0	682.1	662.7	662.7	659.3	662.4	714.5	680.0	706.1
A^0	681.3	661.9		658.5	661.6	713.3	679.2	705.3
$H^\pm$	685.8	666.5		663.2	666.2	718.1	683.7	710.2
$\tilde{u}_1$	725.4	736.4		744.6	744.6	742.5	755.4	728.9
$\tilde{u}_2$	735.0	745.4		754.3	754.3	752.1	765.2	738.3
$\tilde{d}_1$	725.3	736.2		744.4	744.5	742.4	755.2	728.8
$\tilde{d}_2$	738.9	749.3		758.1	758.1	756.1	769.2	742.3
$\tilde{t}_1$	521.6	553.9		564.4	564.4	502.3	536.4	498.5
$\tilde{t}_2$	675.4	699.2		711.2	711.3	661.8	684.1	652.1
$\tilde{b}_1$	627.0	646.4		656.6	656.7	641.6	662.0	629.2
$\tilde{b}_2$	722.5	733.9		742.1	742.1	740.1	753.0	726.5
$\tilde{g}$	537.7	548.5		576.0	576.1	567.7	524.7	562.5
accuracy	0.0000	0.0000		0.0000	0.0000			

Table C.5
GDR5: $m_0 = 600 \quad M_{\frac{1}{2}} = 200 \quad A_0 = 500 \quad \tan\beta = 6. \quad \mathrm{sgn}(\mu) = -$

	MUSE-1	MUSE-2	FeynHiggs	MUSE-2E	MUSE-2'	Isajet	SuSpect	Spythia
μ(low)	954.1	907.1		881.6	908.9		978.3	996.2
α(low)	0.00768	0.00768		0.00768	0.00768		0.00782	0.00776
α_s(low)(DR)	0.1028	0.1130		0.1122	0.1120			
α_s(low)(MS)	0.1152	0.1286		0.1277	0.1275		0.1200	0.1313
$\Lambda_{\rm GUT}/10^{16}$	1.4352	2.5669		2.4467	2.4210		2.7465	2.0916
$\alpha_{\rm GUT}$	0.03870	0.04063		0.04051	0.04047		0.04164	0.04100
$\sin^2\theta_W$	0.2343	0.2341		0.2342	0.2342		0.2315	0.2320
$A_{\rm top}$(low)	-167.0	-194.5		-201.5	-200.9		-184.2	-168.1
$\tilde{l}_1$	801.7	801.7		801.7	801.7		801.6	801.7
$\tilde{l}_2$	804.7	804.6		804.8	804.8		804.6	804.7
$\tilde{\nu}$	803.0	802.8		803.1	803.1		802.9	802.9
$\tilde{\tau}_1$	801.4	801.4		801.4	801.4		800.6	801.7
$\tilde{\tau}_2$	804.6	804.5		804.7	804.7		805.2	804.7
$\tilde{\nu}_\tau$	802.8	802.7		803.0	803.0			802.9
$\tilde{\chi}_1^0$	45.9	42.1		44.2	44.3		44.6	43.9
$\tilde{\chi}_2^0$	87.0	78.4		85.7	86.0		86.3	85.4
$\tilde{\chi}_3^0$	981.8	933.3		905.7	933.9		978.7	996.6
$\tilde{\chi}_4^0$	990.0	942.0		914.7	942.6		987.1	1004.7
$\tilde{\chi}_1^\pm$	86.6	77.9		85.2	85.5		86.0	85.0
$\tilde{\chi}_2^\pm$	988.5	940.4		913.0	941.0		985.5	1003.2
h^0	89.3	86.7	83.6	86.5	87.1		87.0	86.7
H^0	1528.9	1487.6	120.0	1424.4	1489.6		1512.9	1517.4
A^0	1528.1	1486.0		1422.6	1488.0		1511.7	1497.2
$H^\pm$	1530.1	1488.1		1424.7	1490.1		1513.7	1509.9
$\tilde{u}_1$	829.2	833.3		834.8	834.6		840.1	831.4
$\tilde{u}_2$	831.6	835.7		837.3	837.2		842.7	834.0
$\tilde{d}_1$	829.3	833.4		834.9	834.8		840.1	831.6
$\tilde{d}_2$	833.3	837.3		839.0	838.8		844.3	835.7
$\tilde{t}_1$	252.8	332.9		335.8	335.3		248.8	172.3
$\tilde{t}_2$	691.6	717.8		718.2	720.0		692.0	663.2
$\tilde{b}_1$	618.7	639.8		641.4	641.4		634.3	607.8
$\tilde{b}_2$	829.0	833.2		834.7	834.5		839.9	831.3
$\tilde{g}$	317.7	333.8		347.0	346.2		293.4	357.3
accuracy	0.0000	0.0007		0.0003	0.0007			

Table C.6
GDR6: $m_0 = 800 \quad M_{\frac{1}{2}} = 112 \quad A_0 = 0 \quad \tan\beta = 2. \quad \mathrm{sgn}(\mu) = +$

	MUSE-1	MUSE-2	FeynHiggs	MUSE-2E	MUSE-2'	Isajet	SuSpect	Spythia
μ(low)	511.7	526.4		506.5	536.7	556.3	540.5	581.4
α(low)	0.00767	0.00767		0.00767	0.00767	0.00782	0.00782	0.00776
α_s(low)(DR)	0.0997	0.1084		0.1080	0.1078			
α_s(low)(MS)	0.1166	0.1290		0.1288	0.1284	0.1326	0.1200	0.1313
$\Lambda_{\rm GUT}/10^{16}$	1.2014	1.9819		1.9444	1.9086	1.7143	2.7465	2.0916
$\alpha_{\rm GUT}$	0.03889	0.04068		0.04064	0.04056	0.03986	0.04182	0.04100
$\sin^2\theta_W$	0.2359	0.2358		0.2359	0.2359	0.2305	0.2315	0.2320
$A_{\rm top}$(low)	-778.6	-863.1		-906.7	-900.0	-751.4	-866.3	-815.9
$\tilde{l}_1$	431.3	431.0		431.7	431.7	430.8	431.1	431.2
$\tilde{l}_2$	495.9	492.9		499.1	499.1	491.0	494.1	495.4
$\tilde{\nu}$	489.5	486.5		492.8	492.8	484.6	487.6	488.9
$\tilde{\tau}_1$	426.7	426.2		426.9	426.9	424.6	424.8	431.2
$\tilde{\tau}_2$	493.9	490.9		497.1	497.1	491.0	493.7	495.4
$\tilde{\nu}_\tau$	487.5	484.4		490.7	490.7	482.8		488.9
$\tilde{\chi}_1^0$	171.4	158.7		166.2	166.7	168.9	164.7	162.6
$\tilde{\chi}_2^0$	320.0	293.9		317.4	319.6	324.8	316.8	315.2
$\tilde{\chi}_3^0$	522.1	537.3		516.5	547.1	560.2	544.5	585.2
$\tilde{\chi}_4^0$	539.7	551.5		534.3	562.4	575.5	560.5	598.3
$\tilde{\chi}_1^\pm$	319.3	293.4		316.7	319.1	324.6	316.6	314.9
$\tilde{\chi}_2^\pm$	539.9	551.9		534.5	562.7	575.5	560.5	598.6
h^0	116.5	116.1	112.7	116.5	116.5	116.9	115.3	115.4
H^0	850.9	882.0	881.8	798.2	901.6	727.7	814.1	749.8
A^0	850.7	881.8		798.0	901.5	727.0	813.9	749.6
$H^\pm$	854.3	885.2		801.8	904.8	731.8	817.7	754.1
$\tilde{u}_1$	875.3	910.5		931.2	928.3	926.4	1003.0	899.5
$\tilde{u}_2$	908.1	941.2		963.3	960.4	958.5	1034.5	930.2
$\tilde{d}_1$	871.9	907.3		928.0	925.1	923.2	1000.0	896.3
$\tilde{d}_2$	911.4	944.4		966.4	963.5	961.8	1037.6	933.3
$\tilde{t}_1$	679.5	718.7		738.1	735.7	701.4	760.8	654.6
$\tilde{t}_2$	916.8	963.5		986.1	983.3	908.8	987.2	886.3
$\tilde{b}_1$	818.8	855.0		876.9	873.9	863.9	937.0	830.5
$\tilde{b}_2$	867.8	903.6		924.1	921.4	919.0	993.5	891.6
$\tilde{g}$	951.0	973.0		1016.2	1012.8	1009.8	1049.4	986.7
accuracy	0.0000	0.0000		0.0000	0.0000			

Table D.1
LHC2: $m_0 = 400 \quad M_{\frac{1}{2}} = 400 \quad A_0 = 0 \quad \tan\beta = 10. \quad \mathrm{sgn}(\mu) = +$

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	MUSE-1	MUSE-2	FeynHiggs	MUSE-2E	MUSE-2'	Isajet	SuSpect	Spythia
μ(low)	-248.6	-243.9		-245.5	-247.4	-265.1	-253.7	-253.4
α(low)	0.00775	0.00775		0.00775	0.00775	0.00782	0.00782	0.00776
α_s(low)(DR)	0.1102	0.1210		0.1204	0.1204			
α_s(low)(MS)	0.1198	0.1329		0.1326	0.1325	0.1362	0.1200	0.1313
$\Lambda_{\rm GUT}/10^{16}$	1.8010	2.9069		2.8356	2.8347	2.4926	2.7465	2.0916
$\alpha_{\rm GUT}$	0.04023	0.04200		0.04194	0.04194	0.04161	0.04174	0.04100
$\sin^2\theta_W$	0.2329	0.2328		0.2329	0.2329	0.2303	0.2315	0.2320
$A_{\rm top}$(low)	-178.2	-201.9		-212.7	-212.7	-184.0	-184.1	-170.0
$\tilde{l}_1$	206.5	206.5		206.6	206.6	206.5	206.3	206.5
$\tilde{l}_2$	215.8	215.4		216.3	216.3	215.7	215.5	215.7
$\tilde{\nu}$	206.7	206.3		207.2	207.2	206.6	206.7	206.5
$\tilde{\tau}_1$	206.4	206.4		206.5	206.5	206.1	205.9	206.5
$\tilde{\tau}_2$	215.8	215.4		216.2	216.2	216.0	215.8	215.7
$\tilde{\nu}_\tau$	206.7	206.3		207.2	207.2	206.6		206.5
$\tilde{\chi}_1^0$	45.3	42.0		44.2	44.2	44.5	45.0	44.5
$\tilde{\chi}_2^0$	96.1	88.8		95.6	95.5	97.0	96.6	95.0
$\tilde{\chi}_3^0$	256.7	251.9		253.5	255.4	269.8	258.2	258.3
$\tilde{\chi}_4^0$	273.6	269.6		270.6	272.4	286.1	275.5	275.1
$\tilde{\chi}_1^\pm$	95.6	88.1		95.1	95.0	96.4	95.9	94.5
$\tilde{\chi}_2^\pm$	272.2	268.0		269.1	271.0	284.4	273.7	273.6
h^0	67.5	68.4	68.2	69.0	69.0	68.6	65.9	68.2
H^0	373.7	368.6	369.4	364.6	371.9	384.9	377.8	372.1
A^0	365.4	360.0		355.9	363.4	376.7	369.5	365.9
$H^\pm$	374.0	368.8		364.8	372.1	384.6	377.9	373.5
$\tilde{u}_1$	298.7	307.3		313.3	313.3	312.5	303.6	308.1
$\tilde{u}_2$	303.8	312.0		318.4	318.4	317.6	308.7	312.6
$\tilde{d}_1$	299.7	308.3		314.2	314.2	313.6	304.5	309.1
$\tilde{d}_2$	309.9	318.0		324.2	324.2	323.5	314.7	318.2
$\tilde{t}_1$	259.2	265.6		269.1	269.4	258.2	254.3	264.6
$\tilde{t}_2$	321.9	338.6		346.2	345.9	319.9	314.9	316.8
$\tilde{b}_1$	262.7	273.4		279.9	279.9	275.1	269.2	274.8
$\tilde{b}_2$	299.8	308.3		314.3	314.3	313.5	304.4	309.1
$\tilde{g}$	281.4	288.0		302.6	302.6	300.2	262.1	298.9
accuracy	0.0000	0.0000		0.0000	0.0000			

Table D.2
LHC3: $m_0 = 200 \quad M_{\frac{1}{2}} = 100 \quad A_0 = 0 \quad \tan\beta = 2. \quad \mathrm{sgn}(\mu) = -$

	MUSE-1	MUSE-2	FeynHiggs	MUSE-2E	MUSE-2'	Isajet	SuSpect	Spythia
μ(low)	305.1	229.8		219.8	230.5	382.2	275.2	374.0
α(low)	0.00768	0.00768		0.00768	0.00768	0.00783	0.00782	0.00776
α_s(low)(DR)	0.1035	0.1135		0.1131	0.1130			
α_s(low)(MS)	0.1191	0.1329		0.1326	0.1325	0.1322	0.1200	0.1313
$\Lambda_{\rm GUT}/10^{16}$	1.6061	2.6288		2.5711	2.5624	2.1521	2.7465	2.0916
$\alpha_{\rm GUT}$	0.03938	0.04117		0.04114	0.04112	0.04092	0.04182	0.04100
$\sin^2\theta_W$	0.2347	0.2344		0.2345	0.2346	0.2310	0.2315	0.2320
$A_{\rm top}$(low)	-407.4	-451.2		-474.9	-474.3	-397.2	-433.2	-408.0
$\tilde{l}_1$	804.9	804.9		805.0	805.0	804.9	804.9	804.9
$\tilde{l}_2$	814.3	813.9		814.8	814.8	813.6	814.1	814.2
$\tilde{\nu}$	810.5	810.0		811.0	811.0	809.7	810.2	810.3
$\tilde{\tau}_1$	797.3	797.0		797.1	797.1	796.6	796.7	804.9
$\tilde{\tau}_2$	810.6	810.0		810.9	810.9	811.6	811.1	814.2
$\tilde{\nu}_\tau$	806.7	806.1		807.0	807.0	806.3		810.3
$\tilde{\chi}_1^0$	81.3	72.5		75.9	76.5	81.9	79.1	79.7
$\tilde{\chi}_2^0$	149.7	126.5		135.2	137.6	158.0	144.2	151.5
$\tilde{\chi}_3^0$	315.2	240.5		230.2	240.8	388.5	283.1	380.5
$\tilde{\chi}_4^0$	335.4	270.6		266.8	274.3	402.6	308.5	394.6
$\tilde{\chi}_1^\pm$	148.5	123.7		131.9	134.7	157.6	143.0	151.0
$\tilde{\chi}_2^\pm$	336.4	271.5		267.4	275.0	403.5	309.1	395.8
h^0	112.0	112.1	110.3	112.4	112.3	112.3	111.4	111.1
H^0	894.9	866.9	866.9	842.1	869.7	882.9	858.3	880.4
A^0	894.7	866.7		841.9	869.5	882.1	858.1	880.1
$H^\pm$	898.1	870.2		845.5	873.0	886.3	861.7	884.1
$\tilde{u}_1$	895.2	904.7		910.9	910.8	908.3	922.3	895.2
$\tilde{u}_2$	902.9	912.1		918.8	918.6	915.0	930.3	903.1
$\tilde{d}_1$	895.2	904.7		910.8	910.7	908.3	922.2	895.1
$\tilde{d}_2$	906.2	915.3		922.0	921.9	918.4	933.7	906.4
$\tilde{t}_1$	592.1	628.6		637.3	637.1	558.7	602.0	550.1
$\tilde{t}_2$	810.7	838.3		848.3	848.2	782.2	812.3	772.4
$\tilde{b}_1$	754.1	775.6		783.7	783.4	759.0	785.1	745.7
$\tilde{b}_2$	885.5	896.2		902.3	902.2	899.4	913.6	886.0
$\tilde{g}$	547.7	562.1		588.8	588.4	578.7	524.7	574.1
accuracy	0.0000	0.0000		0.0000	0.0000			

Table D.3
LHC4: $m_0 = 800 \quad M_{\frac{1}{2}} = 200 \quad A_0 = 0 \quad \tan\beta = 10. \quad \mathrm{sgn}(\mu) = +$

	MUSE-1	MUSE-2	FeynHiggs	MUSE-2E	MUSE-2'	Isajet	SuSpect	Spythia
μ(low)	491.0	500.3		481.4	513.3	521.2	521.2	546.1
α(low)	0.00771	0.00771		0.00771	0.00770	0.00782	0.00782	0.00776
α_s(low)(DR)	0.1024	0.1111		0.1107	0.1105			
α_s(low)(MS)	0.1175	0.1295		0.1293	0.1290	0.1345	0.1200	0.1313
$\Lambda_{\rm GUT}/10^{16}$	1.2681	2.0091		1.9657	1.9566	1.9207	2.7465	2.0916
$\alpha_{\rm GUT}$	0.03939	0.04101		0.04097	0.04095	0.04025	0.04175	0.04100
$\sin^2\theta_W$	0.2352	0.2351		0.2352	0.2353	0.2303	0.2315	0.2320
$A_{\rm top}$(low)	-483.6	-523.6		-553.8	-553.0	-470.0	-506.6	-494.1
$\tilde{l}_1$	157.5	156.9		158.1	158.1	157.2	157.0	157.2
$\tilde{l}_2$	241.9	238.4		245.5	245.5	238.8	239.6	241.3
$\tilde{\nu}$	233.4	229.7		237.1	237.1	230.2	231.2	232.7
$\tilde{\tau}_1$	157.3	156.8		157.9	157.9	156.8	156.6	157.2
$\tilde{\tau}_2$	241.8	238.3		245.4	245.4	238.9	239.8	241.3
$\tilde{\nu}_\tau$	233.3	229.7		237.1	237.1	230.1		232.7
$\tilde{\chi}_1^0$	123.7	114.3		120.2	120.7	122.0	120.8	119.2
$\tilde{\chi}_2^0$	231.6	211.0		229.5	231.5	234.4	230.1	228.7
$\tilde{\chi}_3^0$	500.7	510.3		490.4	523.0	522.5	522.4	547.4
$\tilde{\chi}_4^0$	524.2	531.6		514.5	544.7	544.8	544.7	567.6
$\tilde{\chi}_1^\pm$	230.2	209.7		228.0	230.3	233.6	229.3	227.8
$\tilde{\chi}_2^\pm$	521.5	529.0		511.7	542.1	541.8	541.8	565.0
h^0	93.8	93.5	93.8	93.8	94.1	95.1	92.3	93.6
H^0	657.6	669.5	670.4	616.9	688.4	635.3	654.3	661.0
A^0	653.5	665.4		612.3	684.3	630.5	649.9	656.8
$H^\pm$	658.1	670.0		617.3	688.8	635.7	654.6	661.7
$\tilde{u}_1$	616.7	641.8		660.1	659.5	662.8	696.5	641.7
$\tilde{u}_2$	643.3	666.5		685.9	685.2	684.9	721.9	665.4
$\tilde{d}_1$	614.1	639.4		657.7	657.0	660.4	694.1	639.5
$\tilde{d}_2$	646.3	669.4		688.7	688.0	687.9	724.6	668.0
$\tilde{t}_1$	465.1	492.9		510.5	508.5	486.0	511.8	448.1
$\tilde{t}_2$	707.3	738.0		755.3	756.8	699.3	737.8	685.6
$\tilde{b}_1$	591.2	615.8		634.5	633.8	629.0	662.9	604.3
$\tilde{b}_2$	615.3	640.5		658.8	658.2	660.8	694.0	639.8
$\tilde{g}$	726.7	737.9		773.0	772.3	765.7	786.5	754.3
accuracy	0.0000	0.0000		0.0000	0.0000			

Table D.4
LHC5: $m_0 = 100 \quad M_{\frac{1}{2}} = 300 \quad A_0 = 300 \quad \tan\beta = 2. \quad \mathrm{sgn}(\mu) = +$

	MUSE-1	MUSE-2	FeynHiggs	MUSE-2E	MUSE-2'	Isajet	SuSpect Spythia
μ(low)						-289.6	-280.4
α(low)						0.00782	0.00776
α_s(low)(DR)							
α_s(low)(MS)						0.1334	0.1313
$\Lambda_{\rm GUT}/10^{16}$						2.3007	2.0916
$\alpha_{\rm GUT}$						0.04060	0.04100
$\sin^2\theta_W$						0.2310	0.2320
$A_{\rm top}$(low)						-382.8	-410.7
$\tilde{l}_1$						218.9	218.9
$\tilde{l}_2$						250.3	251.1
$\tilde{\nu}$						237.2	237.8
$\tilde{\tau}_1$						128.9	218.9
$\tilde{\tau}_2$						260.8	251.1
$\tilde{\nu}_\tau$						218.2	237.8
$\tilde{\chi}_1^0$						81.4	80.2
$\tilde{\chi}_2^0$						153.4	148.8
$\tilde{\chi}_3^0$						299.6	290.6
$\tilde{\chi}_4^0$						315.4	307.0
$\tilde{\chi}_1^\pm$						153.2	148.6
$\tilde{\chi}_2^\pm$						318.1	310.1
h^0						111.1	110.6
H^0						152.6	186.8
A^0						152.5	186.8
$H^\pm$						178.1	204.8
$\tilde{u}_1$						494.5	482.9
$\tilde{u}_2$						508.2	496.1
$\tilde{d}_1$						494.5	482.8
$\tilde{d}_2$						514.5	501.8
$\tilde{t}_1$						360.8	349.6
$\tilde{t}_2$						505.4	507.1
$\tilde{b}_1$						377.3	375.8
$\tilde{b}_2$						473.7	465.9
$\tilde{g}$						536.9	532.3
accuracy							

Table D.5
LHC6: $m_0 = 200 \quad M_{\frac{1}{2}} = 200 \quad A_0 = 0 \quad \tan\beta = 45. \quad \mathrm{sgn}(\mu) = -$