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SOFTSUSY

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Voigt and A G Williams

QUICK INSTALLATION AND RUN TEST

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See the "INSTALL" file in this directory for installation instructions.

There are five C++ test programs, four of which can be run by the commands

> ./softsusy.x

> ./rpvsoftsusy.x

> ./rpvneut.x

> ./softsusy-nmssm.x

The output from these commands can be checked against outputTest,

rpvOutputTest, neutOutputTest and respectively.

You can run the SUSY Les Houches Accord input provided by running the commands

> ./softpoint.x leshouches < lesHouchesInput

> ./softpoint.x leshouches < slha2Input

> ./softpoint.x leshouches < rpvHouchesInput

You may check the output of these commands against the output files

lesHouchesOutput, slha2Output and rpvHouchesOutput, respectively, that are

provided with the SOFTSUSY distribution

Alternatively, run with command line inputs, for example

> ./softpoint.x nmssm sugra --m0=125 --m12=125 --a0=-300 --tanBeta=10

--lambda=0.1 --lambdaAt Msusy

See the manual (in the doc/ subdirectory) threeLoop.pdf for instructions on

how to switch two-loop threshold corrections/three loop RGEs at run-time, once

they've been compiled.

INTRODUCTION

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The most recent version of SOFTSUSY and full documentation can be obtained

from: http://softsusy.hepforge.org/

This program provides a SUSY spectrum in the NMSSM, or the MSSM including

flavour violation and with or without R-parity consistent with input Standard

Model fermion mass/mixings and electroweak/strong coupling data. The R-parity

violating mode can calculate neutrino masses and mixings to 1 loop.

REFERENCES

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If you use SOFTSUSY to write a paper, please cite (see MCnet guidelines)

[1] B.C. Allanach, Comput. Phys. Commun. 143 (2002) 305-331, hep-ph/0104145,

which is the SOFTSUSY manual for the R-parity conserving MSSM. If you

calculate in the NMSSM, please cite [1] and

[2] B.C. Allanach, P. Athron, L. Tunstall, A. Voigt and A. Williams,

arXiv:1311.7659.

If you use the R-parity violating aspects, please cite [1] and

[3] B.C. Allanach and M.A. Bernhardt, Comput. Phys. Commun. 181 (2010) 232,

arXiv:0903.1805.

If you use it to calculate neutrino masses and mixings, please cite [1], [3] and

[4] B.C. Allanach, M. Hanussek and C.H. Kom, Comput. Phys. Commun. 183 (2012)

785, arXiv:1109.3735.

If you use the three-loop RGEs or two-loop threshold corrections, please cite

[1] and

[5] B.C. Allanach, A. Bednyakov and R. Ruiz de Autri, arXiv:????.????

CALCULATING DECAYS IN THE NMSSM

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To link with NMSSMTools, so that SOFTSUSY NMSSM output can be piped through it

(to calculate decays, for example), you'll need to download and

NMSSMTools. Then, you can link it using by running

> ./setup\_nmssmtools.sh --nmssmtools-dir=/path/to/NMSSMTools --compile

After this, there will be an additional executable ./softsusy\_nmssmtools.x

that calculates the spectrum with SOFTSUSY, and decays with NMSSMTools. It can

be run by (for example):

> ./softsusy\_nmssmools.x leshouches < inOutFiles/nmssmSLHAnoZ3Input

If you use it, you should of course provide the proper citations to

NMSSMTools. Using the program in this mode, you should make sure in the SLHA

input file that Block SOFTSUSY variables 15 and 17 are set to 1.

If you use SOFTSUSY to write a paper, please cite B.C. Allanach,

Comp. Phys. Comm. 143 (2002) 305, hep-ph/0104145, which is the SOFTSUSY

manual. If you use the R-parity violating aspects, please cite

B.C. Allanach and M.A. Bernhardt, Comp. Phys. Comm. 181 (2010) 232,

arXiv:0903.1805 [hep-ph].

If you use neutrino masses or mixings, please cite

B.C. Allanach, M. Hanussek and C.H. Kom, Comput. Phys. Commun. 183 (2012) 785,

arXiv:1109.3735 [hep-ph].

The manuals on the electronic hep-ph/ archive will be updated with the most

recent version.

There are detailed comparisons between SOFTSUSY and other publicly available

codes in

\* Precise Determination of the Neutral Higgs Boson Masses in the MSSM,

B.C. Allanach, A. Djouadi, J.L. Kneur, W. Porod, P. Slavich, JHEP 0409

(2004) 044, hep-ph/0406166,

\* Theoretical uncertainties in sparticle mass predictions from

computational tools, B.C. Allanach, S. Kraml, W. Porod, JHEP 03 (2003)

045, hep-ph/0302102

EXECTUABLE FILES: AFTER INSTALLATION

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\* softpoint.x: command-line interface. GMSB, AMSB, mSUGRA and general

boundary conditions possible. Main program: src/softpoint.cpp

\* softsusy.x: example C++ test program - calculates spectrum of SPS1a

mSUGRA point with varying tan beta. Main program: src/main.cpp

\* softsusy-nmssm.x: example NMSSM test program - loops over tan beta. Main

program: src/main-nmssm.cpp

\* rpvsoftsusy.x: example C++ test program - calculates spectrum of SPS1a

mSUGRA point with varying lambda'\_{331}(M\_GUT). Main program:

src/rpvmain.cpp

\* rpvneut.x: example neutrino mass calculating R-parity violating

test program.

FILES INCLUDED IN THIS DISTRIBUTION

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Source files are to be found in the src/ subdirectory.

INPUT AND INFO FILES

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\* [README] contains installation instructions and a list of included files

\* [inOutFiles/outputTest] is the output from the test program

\* [inOutFiles/slha2Input] is an alternative input file in the SUSY Les

Houches Accord

2 format for SPS1a'

\* [inOutFiles/slha2Output] is the result of running with the above input

file and

includes flavour violation, for inclusion into codes like SusyBsg1.3 which

include flavour corrections

\* [inOutFiles/lesHouchesInput] is an alternative input file in the SUSY

Les Houches Accord format

\* [inOutFiles/rpvHouchesInput] is an alternative input file in the SUSY

Les Houches Accord format for R-parity violation

\* [inOutFiles/rpvHouchesOutput] is the output from the R-parity violating

test program rpvmain.cpp

LICENSE

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