



pMSSM scan update

Jennet Dickinson

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Overview of pMSSM scan strategy

- **1. Sample points** in the 19D pMSSM space
 - Some technical progress, a few open items remaining
- **2. Focus in** on interesting regions of phase space
 - Some technical progress, new ideas
- **3. Generate** signal events
 - Work in progress by Minnesota group
- **4. Perform analyses** for each collider scenario
- **5. Compare performance** of different future experiments

1. Sample points in the 19D pMSSM space

- Technical progress: updates for tag v2.0
 - Interfaces to external packages now in [their own file](#)
 - McMC code now takes a [steering file](#) where you can specify
 - Observables to use in the likelihood
 - Width of Gaussian for stepping
 - McMC code outputs are now
 - 1. summary files in csv format (rather than root trees)
 - 2. tarballs of SLHA files for passing points

1. Sample points in the 19D pMSSM space

- Before launching a large-scale scan, need to:
 - Understand why sometimes $\Delta\rho = \text{NaN}$. This comes apparently from FeynHiggs
 - Double check we can use SPheno reliably
 - Sabine: wino mass differences do not include radiative corrections in 4.0.4. Solved in 4.0.5beta, available from author
 - Higgs mass may not be reliably calculated if gluino mass \gg stop. Are we OK since we replace with FeynHiggs?
- Optimize with of Gaussian for stepping so that (fraction of points with lightest squark mass $> X$) = Y

2. Focus in on interesting regions of phase space

- Technical progress: **post-processing script** (tag v2.0)
 - Takes output of McMC code, calculates additional things, adds them to csv summary files
 - Goal: add information that can be used for over- / under-sampling, rejection of pMSSM points
- So far post-processing includes **micromegas observables**
 - DM relic density, flags for whether point is excluded by $Z \rightarrow$ invisible, LEP, direct detection
 - Can take anywhere from 3 sec to 1.5 min to run micromegas over 1 pMSSM point
 - Speed is less important for post-processing: can parallelize up to 1 point / job

2. Focus in on interesting regions of phase space

- Have HiggsBounds flags for free since we run during MCMC
 - Can throw out points **excluded by LHC Higgs searches**
- New idea: add SModelS to post-processing
 - Suggestion by Sabine at EF workshop: under-sample / throw out points already **excluded by LHC SUSY searches**
 - [SModelS](#) is now included in docker image, plan to run some tests and build interface
- Oversample light stops
- Other ideas for post-processing?