



Scan status and plans

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Snowmass EF08 pMSSM scan

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Initial pMSSM scan strategy

- Scan parameter space with Markov chain Monte Carlo
 - Have some code publicly available (thanks to Malte!)
 - Want to try running it? Check out the [twiki page](#)
- Perform a few (2?) McMC scans targeting ***different physics scenarios***
 - Allows for consistent comparisons across experiments: compare the sensitivity within a single scan
- Timeline goal: submit one scan before the holidays so it can run during the break
 - Start event generation in the new year

Example scans: pros and cons

- **Grand scan** that covers as much parameter space as possible
 - 😊 All regions over parameter space are covered
 - 😞 Risk of poor granularity in some interesting regions
- **Targeted scan** (or scans) focusing e.g. on EWK SUSY
 - 😞 May miss regions of parameter space interesting for other physics scenarios
 - 😊 Guarantees good granularity in the target region

Example scan ranges

Parameter	CMS Run 1	ATLAS Run 1	ATLAS EWK Run 2	ATLAS 3G Run 2	CMS Run 2	Snowmass EWK ??	Snowmass Grand ??
$\tan \beta$	[2, 60]	[1, 60]	[1, 60]	[1, 60]	[2, 60]	[1, 60]	[1, 60]
M_A	[0, 3]	[0.1, 4]	[0, 5]	[0, 5]	[0, 4]	[0, 5]	[0, 5]
$ \mu $	[0, 3]	[0.08, 4]	[0, 2]	[0, 2]	[0, 4]	[0, 2]	[0, 25] ?
$ M_{1l} $	[0, 3]	[0, 4]	[0, 2]	[0, 2]	[0, 4]	[0, 2]	[0, 25] ?
$ M_{2l} $	[0, 3]	[0.07, 4]	[0, 2]	[0, 2]	[0, 4]	[0, 2]	[0, 25] ?
M_3	[0, 3]	[0.2, 3]	[1, 5]	[0, 5]	[0, 10]	[1, 5]	[0, 50]
$m_{L_{12}\sim}, m_{e_{12}\sim}, m_{L_{3}\sim}, m_{e_{3}\sim}$	[0, 3]	[0.09, 4]	10 TeV	[0, 2]	[0, 4]	100 TeV ?	
$m_{Q_{12}\sim}, m_{u_{12}\sim}, m_{d_{12}\sim}$	[0, 3]	[0.2, 4]	10 TeV	[0, 5]	[0, 10]	100 TeV ?	
$m_{Q_{3}\sim}, m_{u_{3}\sim}, m_{d_{3}\sim}$	[0, 3]	[0.1, 4]	[2, 5]	[0, 5]	[0, 10]	[2, 5]	
$ A_{tl} $	[0, 7]	[0, 8]	[1, 5]	[0, 8]	[0, 7]		
$ A_{bl} , A_{\tau l} $	[0, 7]	[0, 4]	[0, 2]	[0, 2]	[0, 7]		

Remaining open question:

- What is the best way to incorporate existing experimental results into the scan?
 - **Directly into the likelihood**
 - Steers the scan away from experimentally excluded regions
 - Could introduce bias if measurement values change later...
 - **By over-sampling in regions of interest**
 - Good for parameters where multiple regions are interesting (e.g. a_μ at best measured and SM values)
- Would be good to use consistent assumptions across scans
- Let's discuss today

Today's agenda

- Some thoughts from the theory side on how to use existing measurements and calculate observables

2:00 PM → 2:10 PM **Introduction**

Speaker: Jennet Dickinson (Fermilab)

2:10 PM → 2:30 PM **Theory perspective**

Speaker: Sven Heinemeyer (IFT (CSIC, Madrid))

2:30 PM → 2:50 PM **HiggsSignals and HiggsBounds**

Speaker: Jonas Wittbrodt (Lund University)