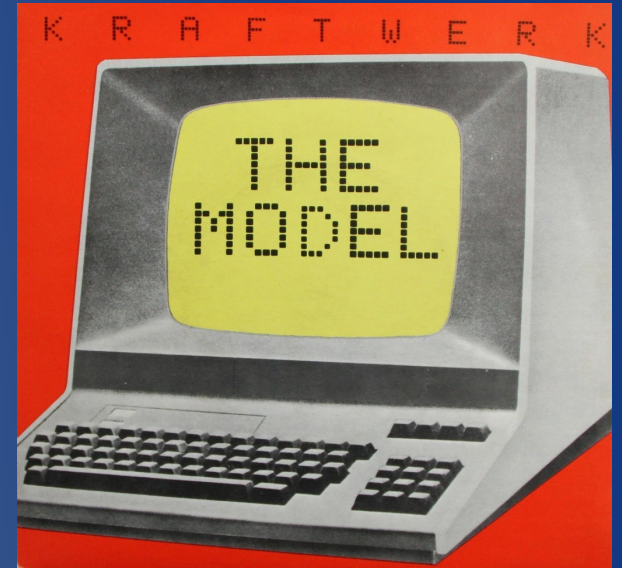


E_6 SSM on HEPMDB

Patrik Svantesson

Steps

- A HEP model:
 - E_6 SSM
- A software model:
 - LanHEP \rightarrow CalcHEP
- Monte Carlo event generation on HEPMDB
- Collider phenomenology on HEPMDB



The Model: E_6 SSM

- Solves the μ -problem with $\lambda SH_u H_d$ without
 - axions
 - cosmological domain walls
 - anomalies
- Interesting phenomenology
 - Higgs
 - Dark Matter
 - gluinos
 - Z' , leptoquarks...

The software model: E₆SSM in LanHEP

- EW scale model without exotics
- Lagrangian →
LanHEP → CalcHEP → HEPMDB

```
/* E6SSM LanHEP model file */  
model 'E6SSM-12.02'/22.  
...  
...  
parameter Svev = 3700 : 'SM-singlet VEV'.  
...  
...  
spinor ~g/~g :(gluino, color c8, mass MSG, width wSG=auto).  
...  
lterm -M2_H1*s_hd*s_Hd.  
...
```

The software model: E₆SSM on HEPMDB

HEPMDB
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Search in HEPMDB

Upload Model

Please fill the fields to add Model

Model Name:*	<input type="text" value="E6SSM 12.02"/>
Authors:*	<input type="text" value="J.P Hall, P. Svantesson"/>
Summarise:*	<input type="text" value="Electroweak scale model of E6SSM without exotics (leptoquarks, singlets, inert Higgs bosons)"/>
Model File:*	<input type="text" value="/home/patrik/Work/E6SSM"/> <input type="button" value="Browse..."/>
Model Tool:*	<input type="text" value="CalcHEP"/>

The software model: E₆SSM on HEPMDB

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1. **E6SSM 12.02 (Not Published)**

J.P Hall, P. Svantesson

...

Upload New Model

Event generation on HEPMDB

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Import Model

ID	Models name	Tool
1	55 E6SSM 12.02	CalcHEP
2	49 RPV MSSM	CalcHEP
3	48 3-site model (Whizard)	WHIZARD
4	47 MSSM (Whizard)	WHIZARD
5	46 nMSSM	CalcHEP
6	43 Standard Model (CKM=1)	CalcHEP
7	42 Standard Model	CalcHEP
8	39 FR Standard Model for WHIZARD	WHIZARD
9	38 Minimal Zp models	CalcHEP
10	35 nMSSM	CalcHEP
11	34 NMSSM without Flavor violation	CalcHEP
12	33 NMSSM with Flavor violation	CalcHEP
13	31 Minimal B-L with Higgs 1 loop vertices	CalcHEP

Select

Edit Calcchep batch file

```
Model: E6SSM-12.02
Model changed: False
Gauge: Feynman

#####
# Process Info #
# Process specifies the process. More than #
# one process can be specified. Cuts, #
# regularization and QCD scale should #
# be specified for each one. #
# Decay specifies decays. As many decays #
# as are necessary are allowed. #
# Composite specifies composite particles #
# present in the processes or decays. #
#####
Process: p,p->~g,~g

Decay: ~g->q,q,chi
Decay: chi->chi,q,q
Decay: chi->chi,lep,lep
Decay: t->2*x
Decay: T->2*x
Decay: W+->2*x
Decay: W-->2*x
Decay: Z->2*x

Composite: p=u,U,d,D,G
Composite: q=u,U,d,D,s,S,c,S,b,B,t,T
Composite: lep=e1,e2,e3,E1,E2,E3,n1,n2,n3,N1,N2,N3
```

Load full batch Save

Event generation on HEPMDB

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Validation

Job #22282-----Friday 02nd of March 2012 09:48:00 AM-----

CalcHEP Numerical Details

Done!

Processes	sigma (fb)	PID	Time (hr)	N events
u,U->~g,~g	1.0983e+01	1255818	0.01	1351/1351
U,u->~g,~g	1.0964e+01	1255819	0.01	1349/1349
d,D->~g,~g	5.3389e+00	1255820	0.01	689/689
D,d->~g,~g	5.3358e+00	1255821	0.01	688/688
c,C->~g,~g	2.0326e-02	1255822	0.01	25/25
C,c->~g,~g	2.0256e-02	1255823	0.01	25/25
b,B->~g,~g	8.2907e-03	1255824	0.01	25/25
B,b->~g,~g	8.2579e-03	1255825	0.01	25/25
s,S->~g,~g	1.3134e-01	1255826	0.01	29/29
S,s->~g,~g	1.3118e-01	1255827	0.01	29/29
G,G->~g,~g	6.0037e+01	1255828	0.01	6857/6857
Total	9.2978e+01			11092/11092

Decays	width (GeV)	PID	Time (hr)	N events
~g->u,U,~o1	5.4973e-17	1255829	0.01	51001/51000
~g->u,U,~o2	6.9276e-12	1255830	0.01	51001/51000
~g->u,U,~o3	3.6714e-17	1255831	0.01	51001/51000
~g->u,U,~o4	2.4520e-10	1255832	0.01	51001/51000
~g->u,U,~o5	1.3894e-05	1255833	0.01	51001/51000
~g->u,U,~o6	1.1434e-12	1255834	0.01	51001/51000
~g->u,U,~o7	1.2236e-13	1255835	0.01	51001/51000

Event analysis on HEPMDB

HEPMDB

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✓ Lhe and Nt files

[Make Nt file](#) [Print](#) [Download](#) [Delete](#) [Create Unique URL](#)

ID	Name File	Date/Time
1	1900-01-00-single.lhe	1 Mar 2012 13:15
2	1900-01-00-single.nt	1 Mar 2012 14:27
3	e6ssm-l700b-single-1.nt	2 Mar 2012 05:54
4	e6ssm-l700b-single.lhe	2 Mar 2012 05:54

LHE

Please select kinematic variable.
MEFF - Effective Mass

Please select Particle ID.

Min
0

Max
2000

Plot

Event analysis on HEPMDB

HEPMDB

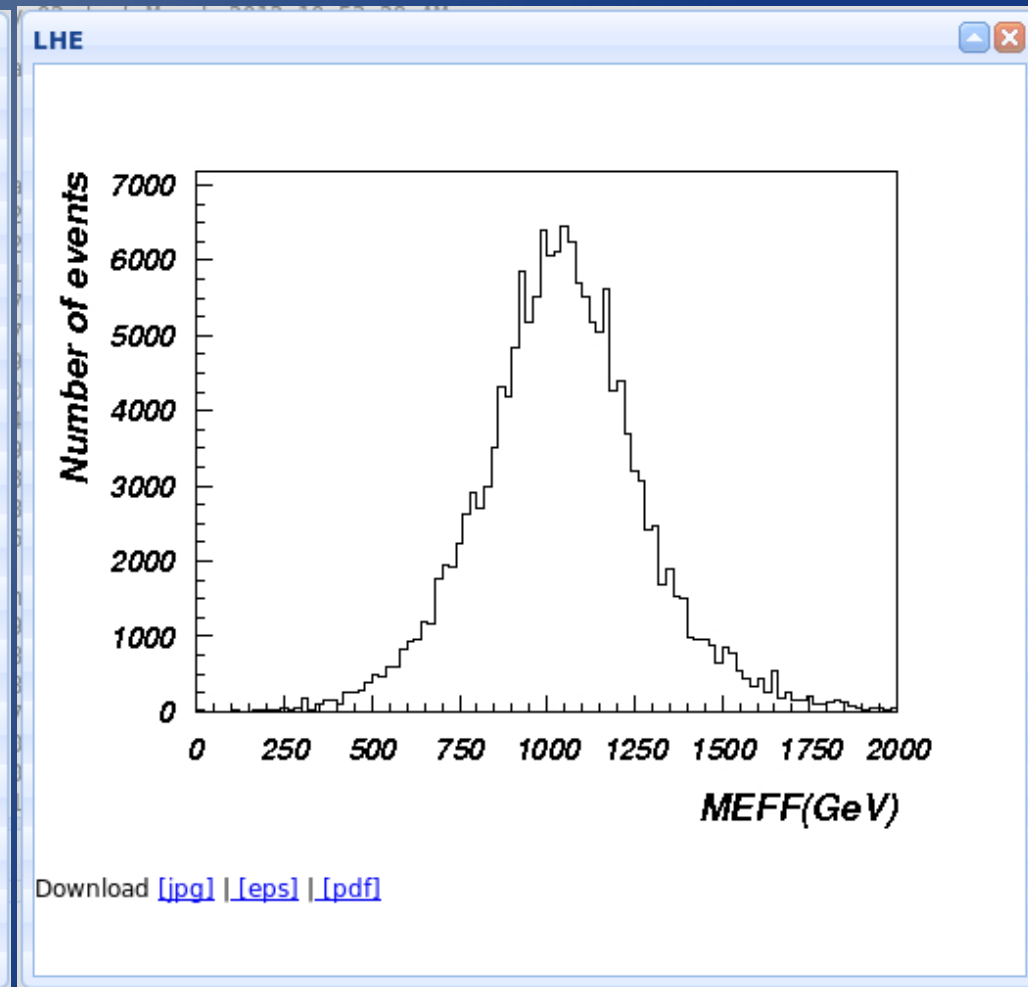
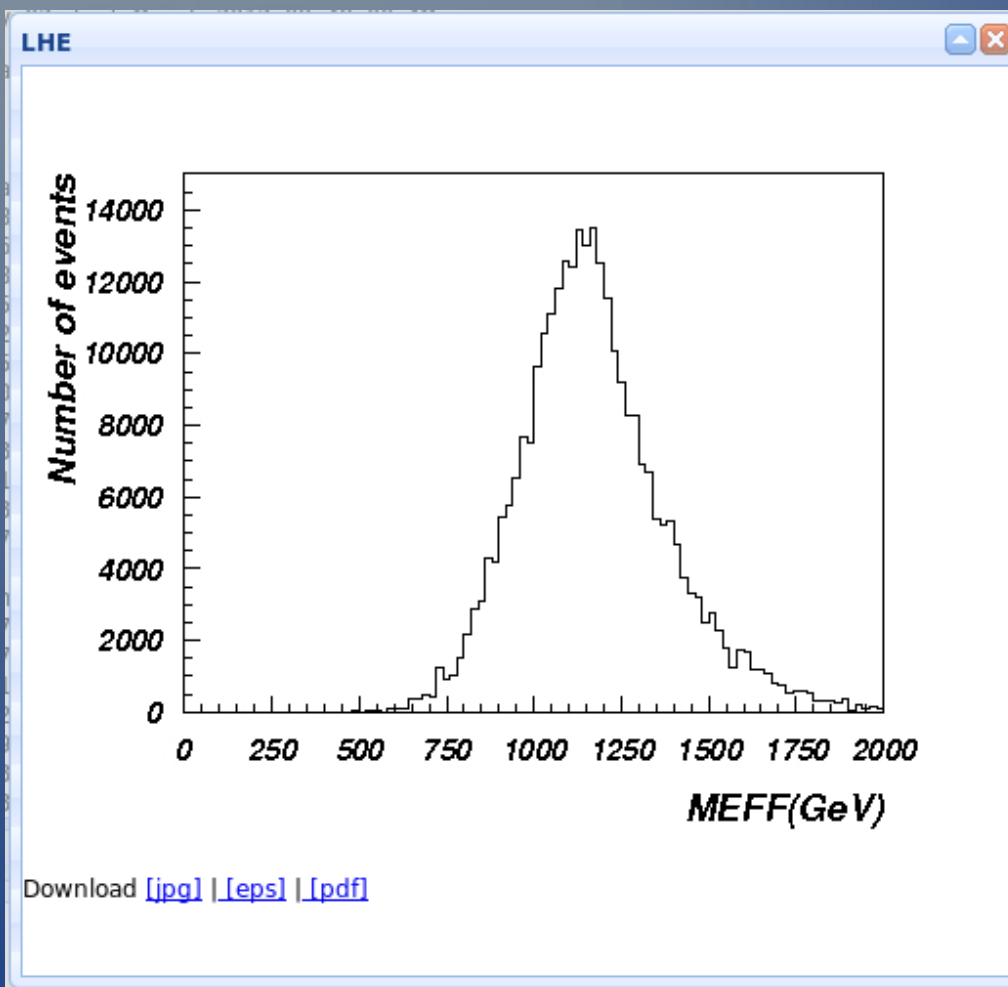
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E_6 SSM

MSSM



Event analysis on HEPMDB

HEPMDB

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E_6 SSM

MSSM

