

# "Decoding new physics from the LHC data" : brainstorming meeting

21 February, 13:00 – 18:00  
Southampton University



**Bld 02/1039 (L/T K):  
actual meeting (14:00-18:00)**

**Bld 46/5047 (13:00)**

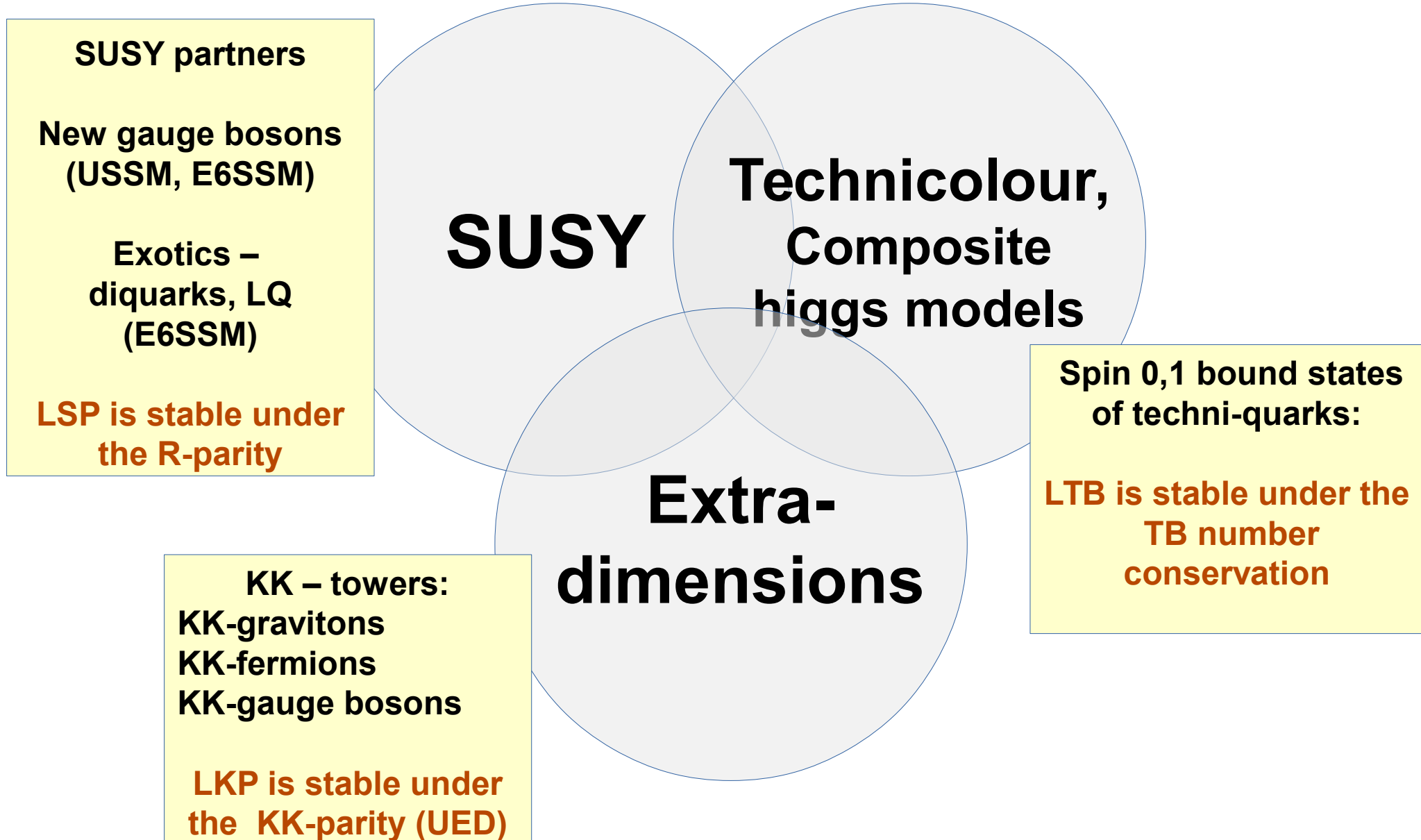
# "Decoding new physics from the LHC data" : brainstorming meeting

13:00	→ 14:00	<b>Lunch</b>
14:00	→ 14:30	<b>Round Table Discussion: Introduction, HEPMDB, PhenoData, General Strategy</b> <b>Speaker:</b> Alexander Belyaev (University of Southampton & Rutherford Appleton Laboratory)
14:30	→ 15:00	<b>Round Table Discussion: Gambit -- the present status and the future</b> <b>Speaker:</b> Pat Scott
15:00	→ 15:30	<b>Round table Discussion: micrOMEGAs and CalcHEP</b> <b>Speaker:</b> Alexander Pukhov (SINP, MSU)
15:30	→ 16:00	<b>Round Table Discussion: developing general strategy on decoding underlying theory</b>
16:00	→ 16:30	<b>Coffee break</b>
16:30	→ 17:30	<b>Round table discussion -- strategy, plan, tools</b>

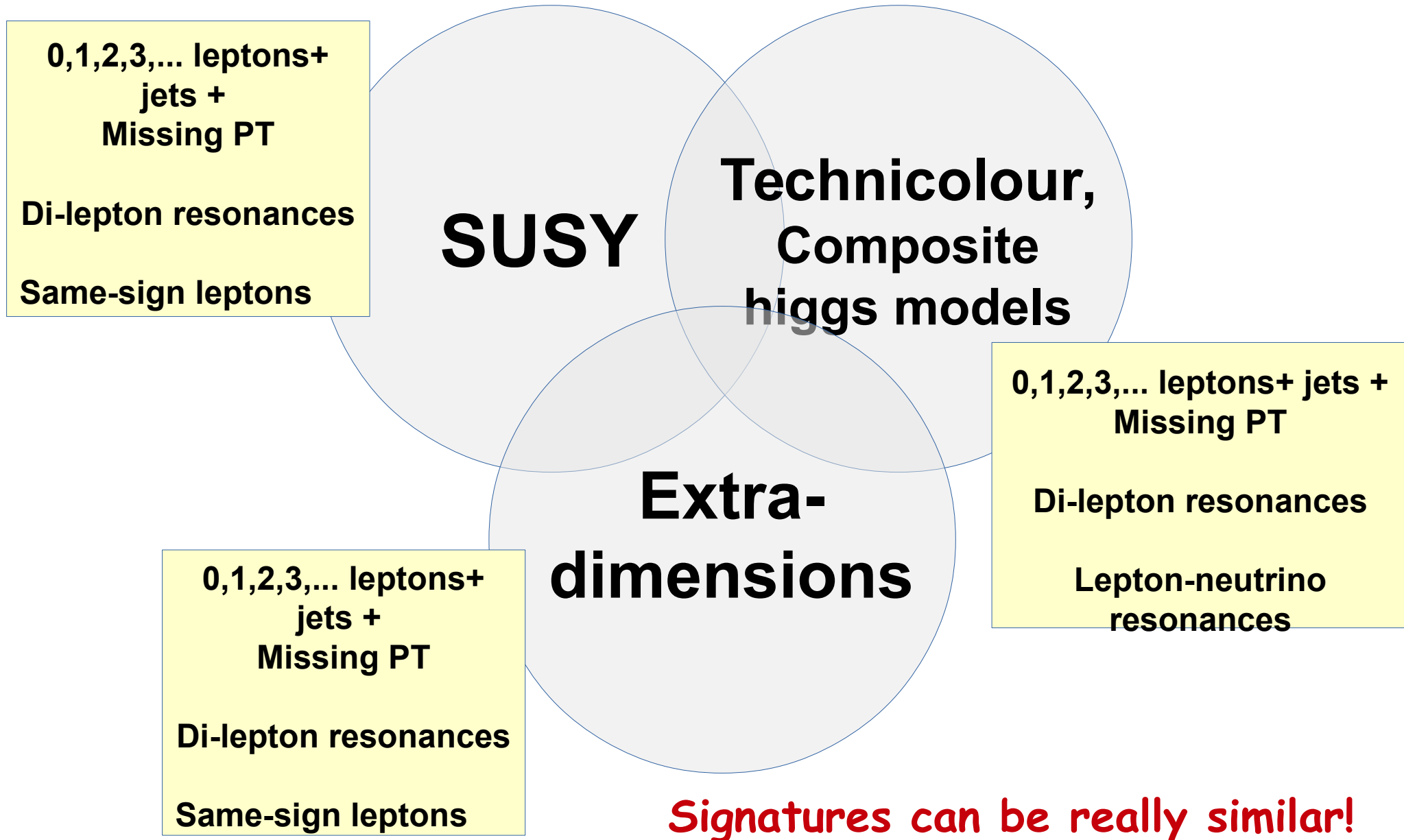
# Points to discuss

- There are several tools and databases, but is there any strategy to perform down→ top decoding?
- What is the framework for this?
- Shall we connect/develop available tools in certain way to achieve this?

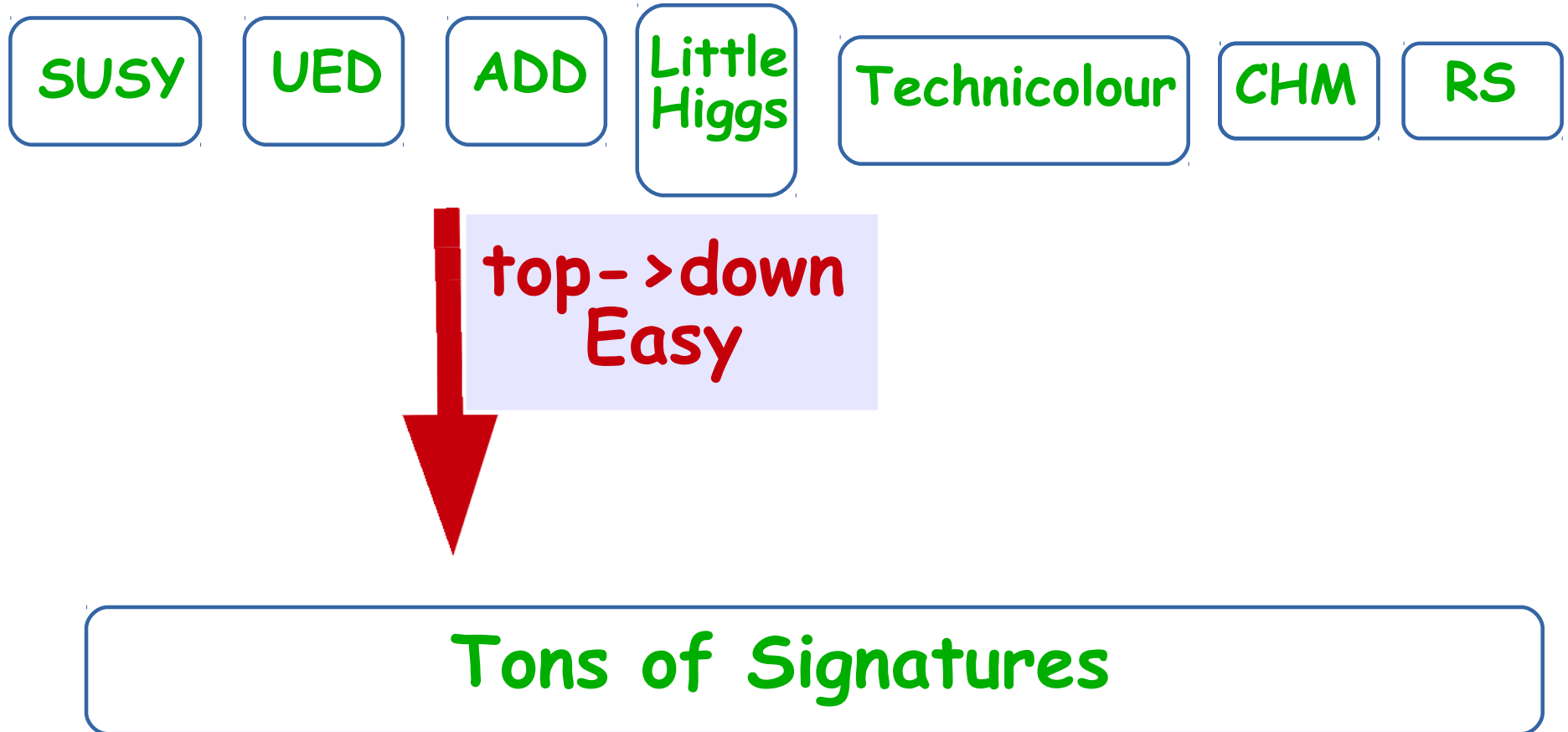
# Theories and new particles



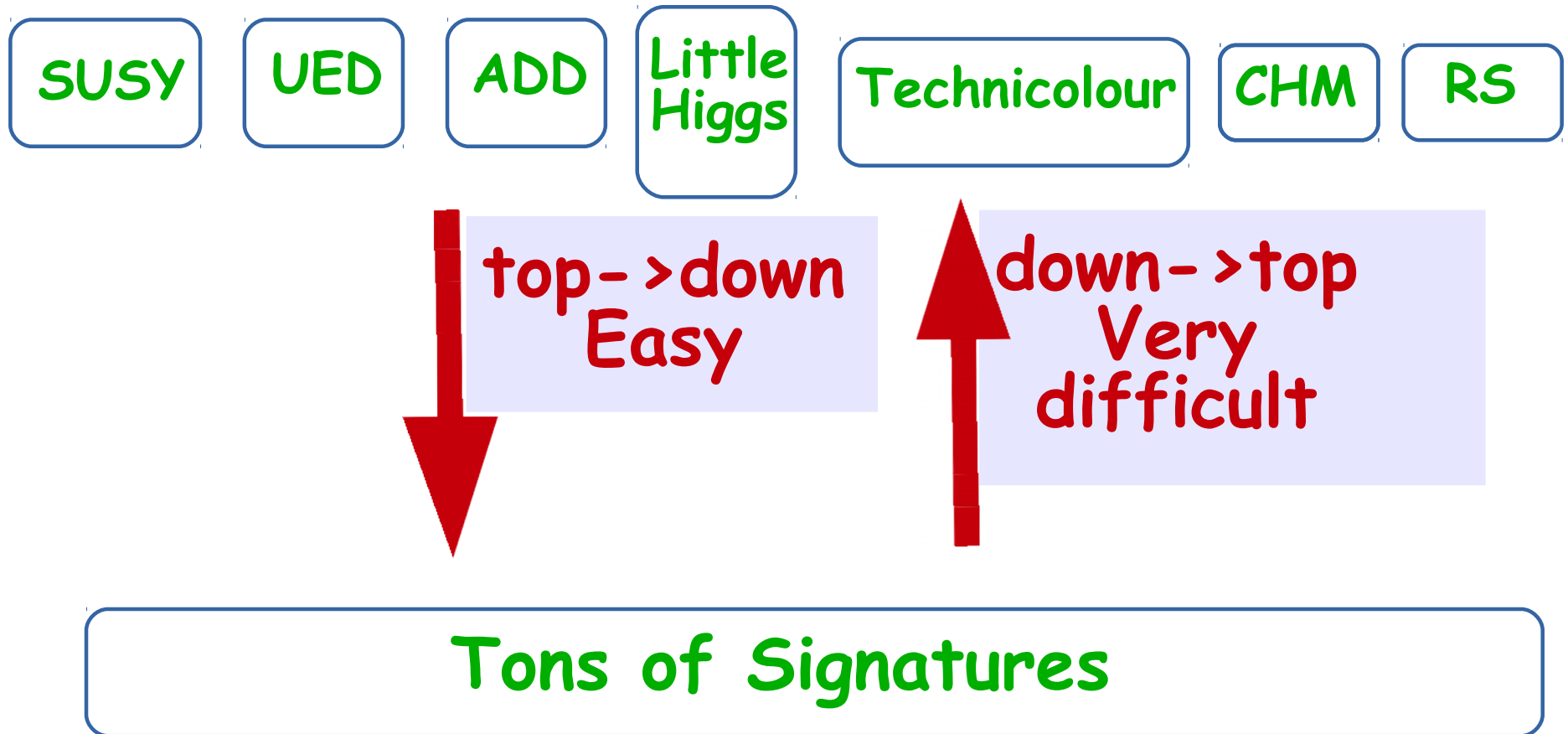
# Theories and new signatures



The main problem is to decode an underlying theory from the complicated set of signatures: down->top



The main problem is to decode an underlying theory from the complicated set of signatures: down->top



# High Energy Physics Model Database

<https://hepmdb.soton.ac.uk/>

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## About HEPMDB

HEPMDB is created to facilitate the connection between High Energy theory and experiment, to store and validate theoretical models, to develop dictionary of the model signatures aimed to identify the fundamental theory responsible for signals expected at the LHC.

HEPMDB is also designed for collecting different signatures for its models as well as respective experimental efficiencies. Using this information HEPMDB will be able to compare its BSM model predictions with LHC data which would allow to discriminate an underlying theory.

The database is in the development stage and your input in the 'Forum' section is highly appreciated. Database collects Particle Physics Models. These models are supposed to be public and represent themselves a set of Feynman Rules which can be in form of input for any of Matrix Element generators such as CalcHEP, CompHEP, FeynArts, Madgraph, SHERPA, WHIZARD. HEPMDB has an entrance for Model authors -- 'Authors' -- where Authors can test and validate their models.

To become an 'Author', you should register in a 'Register' section. 'Authors' are welcomed to also upload LanHEP or FeynRules source of their models.

## Validation

## News

### CalcHEP and HEPMDB: practical introduction and tutorial

2012-05-03 23:13:13

CalcHEP and HEPMDB: practical introduction and tutorial will take place at CERN <https://indico.cern.ch/conferenceDisplay.py?confId=189668>

[More »](#)

### LHAPDF package is added

2012-03-25 12:55:34

LHAPDF is installed at HEPMDB and can be used now. To use LHAPDF installed at HEPMDB with CalcHEP models one should add `-L$HOME/lhapdf/lib/ -ILHAPDF` line to your extlibN.mdl file. P.S. All news about HEPMDB like this one will be sent to all users registered at HEPMDB (they also should have an option not to receive these news if they want)

[More »](#)

### Miniworkshop on High Energy Physics Model Database (HEPMDB)

2012-05-03 23:15:00

Miniworkshop on High Energy Physics Model Database (HEPMDB). At IPPP at Durham we have a one-day mini-workshop on High Energy Physics Model Database (HEPMDB). The schedule and registration are available at <http://indico.cern.ch/event/hepmdb>



# High Energy Physics Model Database

- **Developed at Southampton with support from IPPP, Durham**  
as a result of ideas discussed in the context of the “Dictionary of LHC signatures”, at the FeynRules workshop (April, 2010) and at the Mini-Workshop on Dynamical Symmetry Breaking models and tools (July 2010)
- **Further developed at the Les Houches Workshop, June 2011**

## High Energy Physics Model Database – HEPMDB. Towards decoding of the underlying theory at the LHC.

**arXiv:1203.1488** (the last section of the Les Houches 2011 proceedings)

*Maksym Bondarenko<sup>1</sup>, Alexander Belyaev<sup>1,2</sup>, Lorenzo Basso<sup>1,2,3</sup>, Edward Boos<sup>4</sup>, Vyacheslav Bunichev<sup>4</sup>, R. Sekhar Chivukula<sup>5</sup>, Neil D. Christensen<sup>6</sup>, Simon Cox<sup>7</sup>, Albert De Roeck<sup>8</sup>, Stefano Moretti<sup>1,2</sup>, Alexander Pukhov<sup>4</sup>, Sezen Sekmen<sup>8</sup>, Andrei Semenov<sup>9</sup>, Elizabeth H. Simmons<sup>5</sup>, Claire Shepherd-Themistocleous<sup>2</sup>, Christian Speckner<sup>3</sup>*

### Abstract

We present here the first stage of development of the High Energy Physics Model Data-Base (HEPMDB) which is already a convenient centralized storage environment for HEP models, and can accommodate, via web interface to the HPC cluster, the validation of models, evaluation of LHC predictions and event generation-simulation chain. The ultimate goal of HEPMDB is perform an effective LHC data interpretation isolating the most successful theory for explaining the LHC observations.

# Status of HEPMDB

- **collects HEP models for various ME generators**

[**CalcHEP/CompHEP, FeynArts, MadGraph, SHERPA, WHIZARD, ...** ]

*Under "HEP models" we denote the set of particles, Feynman rules and parameters written in the format specific for a given package*

- **collects models' sources**

[ **FeynRules, LanHEP, SARAH, ...** ]

*FeynRules supports formats for CalcHEP, FeynArts, GoSam, MadGraph, SHERPA and WHIZARD*

*LanHEP works with CalcHEP, CompHEP, FeynArts and GoSam. Also, the latest LanHEP version 3.15 has an option (under testing) to produce UFO format for MadGraph5*

- **allows users to upload *their own models*, perform evaluation ME and event generation HPC cluster behind the HEPMDB.**

*This is one of the very powerful features of the HEPMDB: it provides a web interface to various ME generators which can then also be run directly on the HPC cluster. This way, users can perform calculations for any model from HEPMDB avoiding problems related to installing the actual software, which can sometimes be quite cumbersome*

- **one can plot/save kinematical distributions from generated events**

- **Allows to trace the history of the model modifications, and makes available all the versions of the model**

*Through this application, we stress the importance of reproducibility of the results coming from HEPMDB or from a particular model downloaded from HEPMDB.*

# Model search at HEPMDB

- Allows to search and download an existing HEP model. The search engine checks patterns in the fields:  
Model, Authors, References, Abstract, Signatures and Information

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## Search Models :: Results for [All]

1. **VLO (Model-Independent)** [2014-04-25 09:28:47] hepmdb:0414.0165

*Mathieu Buchkremer (mathieu.buchkremer@uclouvain.be) ; Giacomo Cacciapaglia (g.cacciapaglia@ipnl.in2p3.fr) ; Aldo Deandrea (deandrea@ipnl.in2p3.fr) ; Luca Panizzi (l.panizzi@soton.ac.uk)*

As a generic framework, the four Vector-Like states  $X (Q=5/3)$ ,  $T (2/3)$ ,  $B (-1/3)$  and  $Y (-4/3)$  are introduced as new spin 1/2 class members coupling generically to any of the SM quark generations. Each...

2. **rho resonances in composite Higgs model** [2014-02-18 22:53:43] hepmdb:0214.0154

[Read more](#)

*Roberto Contino, Greco Davide, Da Liu*

...

3. **Simplified Model of Composite Top Partners (STP)** [2014-02-17 16:59:52] hepmdb:0214.0153

*O. Matsedonskyi, A. Wulzer*

# Model search at HEPMDB

- Allows to search and download an existing HEP model. The search engine checks patterns in the fields:  
Model, Authors, References, Abstract, Signatures and Information

44. **minimal B-L** [2011-06-21 10:54:07] hepmdb:0611.0030

*Lorenzo Basso, Alexander Belyaev*

Minimal B-L model,  $U(1)_{B-L}$  extension of the SM with NO Z-Z' mixing (for CalcHEP only). See reference papers. - Description of model and signatures: Phys.Rev.D80:055030,2009. [arXiv:0812.4313] http...

45. **MSSM** [2011-06-21 10:54:07] hepmdb:0611.0028

*CalcHEP/MicrOMEGAs groups*

We present MSSM with SUGRA and AMSB scenario as well as MSSM with low energy input. Read file INSTALLATION for model installation and file CITE for references on scientific publications which pre...

46. **Littlest Higgs Model with T-parity** [2011-06-07 22:09:49] hepmdb:0611.0024

[Read more](#)

*Alexander Belyaev, Chuan-Ren Chen, Kazuhiro Tobe, C.-P. Yuan*

The complete CalcHEP model for Littlest Higgs Model with T-parity (LHT) is presented. The model includes T-odd  $SU(2)$  doublet fermions, playing important role in LHT....

# Models in HEPMDB

- one can upload a new model (upon user registration).
- The model can be uploaded in the format of any ME generator.
- user can upload the model source formats
- HEPMDB allows to keep models as private as well as public ones

Search in HEPMDB



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## Model : VLQ (Model-Independent)

<http://hepmdb.soton.ac.uk/hepmdb:0414.0165>

### Authors

*Mathieu Buchkremer (mathieu.buchkremer@uclouvain.be) ; Giacomo Cacciapaglia (g.cacciapaglia@ipnl.in2p3.fr) ; Aldo Deandrea (deandrea@ipnl.in2p3.fr) ; Luca Panizzi (l.panizzi@soton.ac.uk)*

### Added By

Mathieu Buchkremer

### References

- [1] Nucl.Phys. B876 (2013) 376-417 ; M. Buchkremer, G. Cacciapaglia, A. Deandrea, L. Panizzi ; Model Independent Framework for Searches of Top Partners  
[2] <https://feynrules.irmp.ucl.ac.be/wiki/VLQ>

### Abstract

This model is an extension of the Standard Model (SM) with new top partners, intended for model-independent searches of Vector-Like quarks. The corresponding FeynRules implementation is based on a minimal effective Lagrangian description, which provides a direct connection between experimental observables and the new quark couplings. All fields and parameters are defined accordingly to the parameterisation detailed in [1]. The particle content, Feynman rules and parameters of the model are summarized in [2].

# Models in HEPMDB

- one can upload a new model (upon user registration).
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- user can upload the model source formats

## Information

As a generic framework, the four Vector-Like states  $X$  ( $Q=5/3$ ),  $T$  ( $2/3$ ),  $B$  ( $-1/3$ ) and  $Y$  ( $-4/3$ ) are introduced as new spin  $1/2$  class members coupling generically to any of the SM quark generations. Each class defines a specific top partner with a fixed electric charge, without any assumption on the other quantum numbers. Together with the new fermion fields definitions, the following interactions are added to the SM Lagrangian given in [2]. The new user-defined parameters consist of: -the KAPPA block : the top partners coupling strengths (set to 1 by default), -the MASS block : the corresponding quark masses (set to 600 GeV by default), -the DECAY block : the corresponding total widths (see the note below), -the XI block : the corresponding branching ratios into  $W$ ,  $Z$ , and Higgs bosons, -the ZETA block : all top partners couplings to the three SM quark generations.

## Tools

MadGraph [model]  
FeynRules [source]

## Model History

[2014-04-25 10:29:48](#)  
[2014-04-25 10:29:11](#)  
[2014-04-25 09:31:01](#)  
[2014-04-25 09:30:28](#)

Download Model File

Download Source File

Validate Model on HPCx

## Reviews

# Models in HEPMDB

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- user can upload the model source formats
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## My Models [21]

### 1. Vector-Like Quarks (QVL) (Published)

Alexander Belyaev

Toy Model Model with two species of Vector-Like Quarks (QVL) is presented in the CalcHEP format. This model contains two species of QVL -- t1 and t2 which interacts with W and Z bosons via chir...

### 2. Randal-Sundrum model (Un gauge) (Published)

[Published](#) [More](#) [Edit](#) [Delete](#)

Alexander Belyaev

Model is based on Randall-Sundrum (from CP3) <http://hepmdb.soton.ac.uk/hepmdb:0413.0130> All interactions are given in Unitary gauge, k/Mplank and Lambda cutoff parameters are not independent an...

### 3. KNT (Not Published)

xxx

...

### 4. QBH (Published)

Alexander Belyaev

# Models in HEPMDB

- one can upload a new model (upon user registration).
- The model can be uploaded in the format of any ME generator.
- user can upload the model source formats
- **HEPMDB allows to keep models as private as well a public ones**

### Edit Model

Please fill the fields to edit Model

Model Name:*	<input type="text" value="Vector-Like Quarks (QVL)"/>
Authors:*	<input type="text" value="Alexander Belyaev"/>
Summarise:*	<input type="text" value="Toy Model Model with two species of Vector-Like Quarks (QVL) is presented in the CalcHEP format."/>
Description:	<input 1311.3977"="" abs="" arxiv.org="" http:="" type="text" value="Toy Model Model with two species of Vector-Like Quarks (QVL) is presented in the CalcHEP format.&lt;br/&gt;&lt;br/&gt;This model contains two species of QVL -- t1 and t2 which interacts with W and Z bosons via chiral (left) couplings as well as with gluons the same way as SM quarks.&lt;br/&gt;&lt;br/&gt;This toy model was used to study interference effects in case of (quasi) degenerate QVL species in &lt;a href="/> http://arxiv.org/abs/1311.3977"/>



# Models in HEPMDB

- one can upload a new model (upon user registration).
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Reference 3:

Reference 4:

MET - Large missing transverse momentum:

METHT - Missing + HT:

DJM - Resonance in di-jet invariant mass:

DLM - Resonance in di-lepton invariant mass:

MT3L - Transverse mass from 3-leptons and missing energy:

MT2L - Transverse mass from 2-leptons and missing energy:

Model File:  No file selected.

Model Tool:\*

Source File:  No file selected.

Source Tool:

Public Model:

# evaluation as event generation at HEPMDB

- allows to evaluate cross sections for user-defined processes for the chosen model and produce a respective LHE file. This file is becomes available for download once the process is finished (**user will receive an e-mail notification on this**)
- HEPMDB allows to *share* LHE files with your collaborators and exchange links to them via e-mail  
*Currently, the HEPMDB allows the user to perform these calculations (using the HPC) for CalcHEP, WHIZARD and MadGRAPH 5*
- produces ntuple files and allows to plot various kinematical distributions
- allows to update/add features and respective signatures specific to each model.  
*These features and signatures can be used in the future to distinguish the model from others and connect it to the LHC signatures.*
- allows to collect feedback/remarks on particular model from users in Review section

# Future prospects for HEPMDB

- The LanHEP and FeynRules packages will be added to provide model generation from model sources
- **CompHEP package will be added.**
- A systematic model validation process will be started and the respective pages will be added.
- **The possibility to study events beyond the parton level will be carefully considered, up to detector simulation.**  
One concrete possibility would be the chain  
LHE events -> HEPMC events -> FASTSIM events (ROOT format)  
For the FASTSIM package, Delphes seems a promising candidate.
- **The structure of the database of signatures will be extended to deal with correlated signatures (i.e., whereby multiple signatures, or lacks thereof, must be accounted for simultaneously)**
- **Recent High priority request - to create the DB of processes (LHE files) which can be used by CMS and ATLAS software**

# New packages to be installed at HEPMDB

- we plan to install the *MicrOMEGAs* package for evaluation of the dark matter relic density as well as to provide a possibility for scans of various model parameter spaces.
- Author of other packages/models are welcome to install/upload them
- the format for model predictions consistent with the format for presentation of the LHC data by experimentalists is planned.
- The question about including automatic tools for NLO evaluations is under discussion and will be developed further at the later stages of HEPMDB development.

# Tutorial

Search in HEPMDB

## About HEPMDB

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## Validation

Test and model validation will be available in the nearest future and would include the computing of theoretical predictions for your model on our site via submitting jobs into the High Performance Computing Cluster (HPCC) at University of Southampton. It will also allow to run Feynman Rules generators -- LanHEP and FeynRules through the HPCC. You will learn news about this option in 'Forum' section. HEPMDB also collects signatures of Particle Physics Models, for which we suggest to use keywords which 'Authors' supposed to assign to their models. The database of signatures is in the permanent development and is available in the 'Signatures' section. Information and links on relevant packages, e.g. Matrix Element generators or Feynman Rules generator is located in the section 'Tools'.

Search in HEPMDB

## Search Models :: Results for [Search in HEPMDB]

- RPV MSSM** [2012-02-17 18:30:58] hepmdb:0212.0049  
Uploaded by Metin Ata, created by Benjamin Fuks  
(taken from FeynRules web page) Our implementation keeps all the flavour-violating and helicity-mixing terms in the Lagrangian and also all the possible additional CP-violating phases. In order to de...
- 3-site\_model (Whizard)** [2011-12-30 04:41:37] hepmdb:1211.0048  
Christian Speckner  
3-site model for Whizard...
- MSSM (Whizard)** [2011-12-30 04:38:49] hepmdb:1211.0047  
Christian Speckner  
MSSM model for Whizard...
- nMSSM** [2011-12-30 04:23:30] hepmdb:1211.0046  
from CalcHEP group

Search in HEPMDB

## Upload Model

Please fill the fields to add Model

Model Name:\*

Authors:\*

Summarise:\*

Description:

Model changed: False  
Gauge: Feynman

ID	Name
1	Standard Model

Whizard

```
#####  
# Process Info  
# Process specifies the process. More than #  
# one process can be specified. Cuts, #  
# regularization and OCB 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->W+,Z  
Decay: W->l,e,n  
Decay: Z->l,e,l,n  
  
Composite: p,u,U,d,D,G  
Composite: l,e,m,E,s,M  
Composite: n,n,e,Ne,nm,Nm  
  
#####  
# PDF Info  
# Choices are:  
# cteq6l (anti-proton) #  
# cteq6l (proton) #  
# mrst2007lo (anti-proton) #  
#####
```

Load full batch Save

Job #24161=====Friday 02nd of March 2012 03:23:29 AM=====

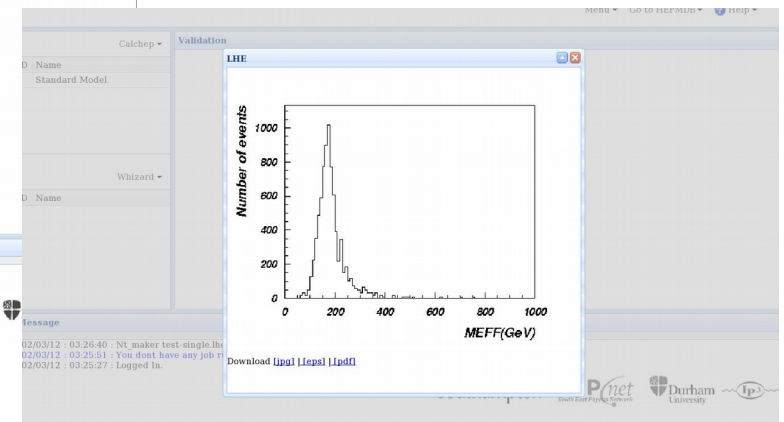
CalcHEP Numerical Details

Done!

Processes	sigma (fb)	PID	Time (hr)	N events
u,D->Z,W+	7.9869e+03	30347	0.00	609/609
0,u->Z,W+	8.0322e+03	30542	0.00	610/610
Total	1.5999e+04			1219/1219

Decays	width (GeV)	PID	Time (hr)	N events
W->E,ne	2.2512e-01	31586	0.00	5101/5100
W->M,nm	2.2512e-01	31846	0.00	5101/5100
Z->e,E	8.3982e-02	407	0.00	5101/5100
Z->ne,M	8.3981e-02	899	0.00	5101/5100

Widths	PID	Time (hr)
Widths	1992	0.00
Total	2.4510e+02	0.01



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## News

### We suffered a failure of the Iridis cooling system earlier this morning

2012-07-10 18:52:13

We suffered a failure of the Iridis cooling system earlier this morning, which led to temperatures in the data centre rising very rapidly. We do not expect to be able o resume a batch service until after lunch.

[More »](#)

### CalcHEP and HEPMDB: practical introduction and tutorial

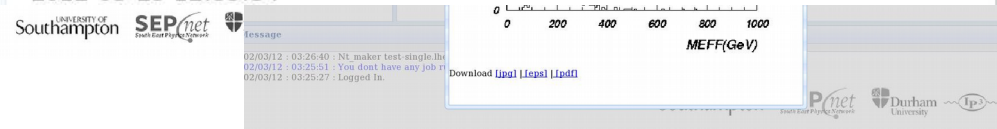
2012-05-03 23:13:13

CalcHEP and HEPMDB: practical introduction and tutorial will take place at CERN <https://indico.cern.ch/conferenceDisplay.py?confId=189668>

[More »](#)

### LHAPDF package is added

2012-03-25 12:55:34



# Tutorial

### Search Models :: Results for [MSSM]

1. **MSSM** [2011-06-21 10:54:07] hepmdb:0611.0028

*CalcHEP/MicrOMEGAs groups*

We present MSSM with SUGRA and AMSB scenario as well as MSSM with low energy input. Read file INSTALLATION for model installation and file CITE for references on scientific publications which pre...

2. **MSSM with bilinear R-Parity violation** [2011-11-17 20:00:51] hepmdb:1111.0036

*Florian Staub*

The MSSM with bilinear R-Parity violating terms in the superpotential and for the soft-breaking terms. Model files created by SARAH 3.1.0 Support of SLHA+ functionality to read spectrum files...

3. **TMSSM** [2011-11-17 20:06:23] hepmdb:1111.0037

*Florian Staub*

Triplet extended MSSM (including possibility of flavor violation) Model files created by SARAH 3.1.0 Support of

Cal

ID	Name
1	Standard Model

Whi

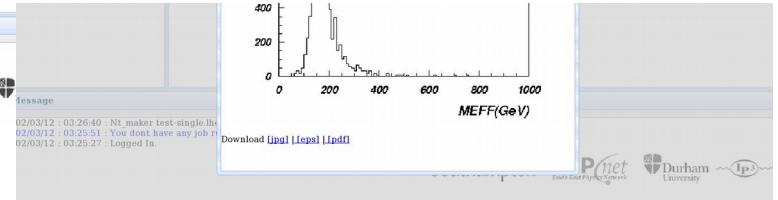
ID	Name
----	------

Message

02/03/12 : 03:21:58 : You  
02/03/12 : 03:21:01 : You  
02/03/12 : 03:21:00 : Log

Message

02/03/12 : 03:23:30 : Job 24161 was finished.  
02/03/12 : 03:23:28 : Logged In.



# Tutorial

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HEPMDB is created to facilitate the connection between High Energy theory and experiment: to store and validate theoretical models expected to be tested in the near future.

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## Upload Model

Please fill the fields to add Model

Model Name: \*

Authors: \*

Summarise: \*

Description:

southampton SEPnet Durham University

Total 2.4510e+02 0.01

Message

02/03/12 : 03:23:30 : Job 24161 was finished.  
02/03/12 : 03:23:28 : Logged in.

UNIVERSITY OF Southampton SEPnet DURHAM UNIVERSITY



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## About HEPMDB

HEPMDB is created to facilitate the connection between High Energy theory and experiment, to store and validate theoretical models, to develop dictionary of the model signatures aimed to identify the fundamental theory responsible for signals expected at the LHC.

HEPMDB is also designed for collecting different signatures for its models as well as respective experimental efficiencies. Using this information HEPMDB will be able to compare its BSM model predictions with LHC data which and would allow to discriminate an underlying theory.

The database is in the development stage and your input in the 'Forum' section is highly appreciated. Database collects Particle Physics Models. These models are supposed to be public and represent themselves a set of Feynman Rules which can be in form of input for any of Matrix Element generators such as CalcHEP, CompHEP, FeynArts, Madgraph, SHERPA, WHIZARD. HEPMDB has an entrance for Model authors -- 'Authors' -- where Authors can test and validate their models.

For more information about HEPMDB, see our [Wiki pages](#)

Ask your [question](#) or file the [problem](#) at launchpad.

## News

**HEPMDB Maintenance today, March 17, 2014, 19:00-24:00 UK time**

2014-03-17 18:19:43

HEPMDB Maintenance today, March 17, 2014, 19:00-24:00 UK time There will be HEPMDB Maintenance today, March 17, 2014, 19:00-24:00 UK time when the HEPMDB service will be not available. Sorry for inconvenience, HEPMDB Team.




[More »](#)

**HEPMDB Maintenance tomorrow, Jan 24, 2014: 9:30-10:30 UK time**

2014-01-23 11:22:27

# Tutorial

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	Validation
Calchep 	
Whizard 	
Madgraph 5 	

## Message

25/04/14 : 12:51:36 : You dont have any job running on HPCx  
25/04/14 : 12:51:34 : Logged In.


UNIVERSITY OF  
Southampton

SEPnet  
South East Physics Network

 Durham  
University








 IP3

# Tutorial

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Calchep ▾ Validation  
Whizard ▾  
Madgraph 5 ▾





Madgraph ▾

ID	Name	
1	proc_card_mg5.dat	 Edit/View Card
2	param_card.dat	Run proc card
3	run_card.dat	Run Event simulation
4	plot_card.dat	Open Events folder
		 Show Processes
		 Save Processes as ...
		Clear Results/Processes
		 Remove RunWeb
		 History
		 Clear History
		 Check submitted job
		Lhe files and Plots
		Show Unique URLs

**Message**

25/04/14 : 12:51:36 : ...  
25/04/14 : 12:51:34 : ...


... on HPCx










# Tutorial

Menu ▾ Go to HEPMDB ▾  Help ▾

Calchep  Validation





Calchep ▾

ID	File Name
1	KNTModel (Feyn. g
2	SM(CKM=1 with h
3	SM+t1t2(CKM=1)C
4	SM+QBH (cont int
5	SM+t1t2(CKM=1)C

-  Import model
- Upload model
-  Edit Short Batch File
-  Edit Full Batch File
- Run Short Batch File
- Run Full Batch File
-  Check model
-  Check submitted job
- View Particles
- View Parameters
- View Run folder
- Lhe files and Plots [on HPCx](#)
- Show Unique URLs
- Upload SLHA file
- Clear Processes
-  History
-  Clear History

Message

25/04/14 : 13:09:24 : Yo  
25/04/14 : 13:09:22 : Lc

# Tutorial

HEPMDB  
High Energy Physics Models DataBase

Home Calculate Tools Signatures Contact Us

Search in HEPMDB

About HEPMI

HEPMDB is created to develop models, to dev... expected at the experimental e... which and would "Forum" section represent then CalchEP, Comp Authors can be welcomed to all

ID	Name
1	Standard Model

Validation

Test and model your model on allow to run Fe "Forum" section Authors' supp... the 'Signatures generator is loc

Calchep

Whizard

Message

02/03/12 : 03:21:58 : You successfully sub...  
02/03/12 : 03:21:01 : You dont have any jo...  
02/03/12 : 03:21:00 : Logged In.

```
Model: Standard Model
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->W+, Z
Decay: W+->le, n
Decay: Z->le, le

Composite: p=u, U, d, D, G
Composite: le=e, E, m, M
Composite: n=ne, Ne, nm, Nm

#####
# PDF Info #
# Choices are: #
# cteq6l (anti-proton) #
# cteq6l (proton) #
# mrst2002lo (anti-proton) #
#####
```

✓ Load full batch ✓ Save

Menu Go to HEPMDB Help

Finished.

SEPnet South East Physics Network

Durham University

Ip-3

Southampton SEPnet Durham University

Message

02/03/12 : 03:26:40 : M. make test single file  
02/03/12 : 03:25:51 : You dont have any job r...  
02/03/12 : 03:25:27 : Logged In.

Download [url] [License] [Pdf]

MEFF(GeV)

0 200 400 600 800 1000

Pnet Durham University

# Batch file in details(1)

```
#####  
# batch_file for CalcHEP #  
# It has to be launched via #  
# ./calchep_batch batch_file #  
# Lines beginning with # are ignored. #  
#####  
#####  
# Model Info #  
# Model is the exact model name. #  
# Model changed specifies whether a change #  
# was made to the model files. Changes #  
# to the numerical values of external #  
# parameters is ok. Other changes #  
# require that the process library be #  
# recreated. Values are True or False. #  
# Gauge specifies gauge. Choices are #  
# Feynman or unitary. #  
#####  
Model: Standard Model(CKM=1)  
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->W,b,B  
Decay: W->le,n
```

```
Composite: p=u,U,d,D,s,S,c,C,b,B,G  
Composite: W=W+,W-  
Composite: le=e,E,m,M  
Composite: n=ne,Ne,nm,Nm  
Composite: jet=u,U,d,D,s,S,c,C,b,B,G
```

```
#####  
# PDF Info #  
# Choices are: #  
# cteq6l (anti-proton) #  
# cteq6l (proton) #  
# mrst2002lo (anti-proton) #  
# mrst2002lo (proton) #  
# cteq6m (anti-proton) #  
# cteq6m (proton) #  
# cteq5m (anti-proton) #  
# cteq5m (proton) #  
# mrst2002nlo (anti-proton) #  
# mrst2002nlo (proton) #  
# ISR #  
# ISR & Beamstrahlung #  
# Equiv. Photon #  
# Laser photons #  
# Proton Photon #  
# OFF #  
#  
# ISR and Beamstrahlung are only available #  
# for electrons and positrons, while the #  
# others are available for protons and #  
# antiprotons. #  
# Default pdf: OFF #  
# Bunch x+y sizes (nm) #  
# Ignored unless ISR & Beam chosen. #  
# Default: 560 #  
# Bunch length (mm) #  
# Ignored unless ISR & Beam chosen. #
```

# Batch file in details(2)

```
# Default: 0.4 #
# Number of particles #
# Ignored unless ISR & Beam chosen. #
# Default: 2E+10 #
# Default Beamstrahlung parameters #
# correspond roughly with ILC. #
# #
# Equiv. Photon, Laser photons and #
# Proton Photon are available for #
# photons. #
# Default pdf: OFF #
# Photon particle #
# Ignored unless Equiv. Photon chosen. #
# Choices are: mu^-,e^-,e^+,mu^+ #
# Default: e^+ #
# |Q|max #
# Ignored unless Equiv. Photon chosen. #
# Default: 100 #
# Incoming particle mass #
# Ignored unless Proton Photon chosen. #
# Default: 0.938 #
# Incoming particle charge #
# Ignored unless Proton Photon chosen. #
# Choices are: 1,-1 #
# Default: 1 #
# |Q^2|max #
# Ignored unless Proton Photon chosen. #
# Default: 2 #
# Pt cut of outgoing proton #
# Ignored unless Proton Photon chosen. #
# Default: 0.1 #
#####
pdf1: cteq6l (proton)
pdf2: cteq6l (proton)
```

```
#Bunch x+y sizes (nm) : 202500
#Bunch length (mm) : 10
#Number of particles : 5E+11

#Photon particle : e^-
#|Q|max : 250
#Incoming particle mass : 0.938
#Incoming particle charge : -1
#|Q^2|max : 2.0
#Pt cut of outgoing proton : 0.15

#####
# Momentum Info #
# in GeV #
#####
p1: 4000
p2: 4000

#####
# Parameter Info #
# Masses and Energies are in GeV #
#####
#Parameter: EE=0.31

#####
# Run Info #
# Masses and Energies are in GeV #
# More than one run can be specified at #
# the same time. #
#####
Run parameter: Mh
Run begin: 120
Run step size: 5
Run n steps: 3
```



# Batch file in details(3)

```
#####  
# QCD Running Info #  
# As in the gui: #  
# parton dist. alpha #  
# default: ON #  
# alpha(MZ) #  
# default: 0.1172 #  
# alpha nf #  
# default: 5 #  
# alpha order #  
# choices: LO, NLO, NNLO #  
# default: NLO #  
# mb(mb) #  
# default: 4.2 #  
# Mtop(pole) #  
# default: 175 #  
# alpha Q #  
# Must be in terms of the final state #  
# particles. #  
# default: M12 #  
# :n: specifies which process. #  
# : means to apply to all processes. #  
#####  
#parton dist. alpha: ON  
#alpha(MZ): 0.118  
#alpha nf: 5  
#alpha order: NLO  
#mb(mb): 4  
#Mtop(pole): 174  
  
#alpha Q :1: M34  
#alpha Q :2: M45  
alpha Q : M45
```

```
#####  
# Cut Info #  
# Must be in terms of the (production mode) #  
# final state particles. #  
# :n: specifies which process. #  
# : means to apply to all processes. #  
#####  
Cut parameter: M(b,B)  
Cut invert: False  
Cut min: 100  
Cut max:  
  
Cut parameter: J(jet,jet)  
Cut invert: False  
Cut min: 0.5  
Cut max:  
  
Cut parameter: T(jet)  
Cut invert: False  
Cut min: 20  
Cut max:  
  
Cut parameter: N(jet)  
Cut invert: False  
Cut min: -2.5  
Cut max: 2.5  
  
#####  
# Kinematics Info #  
# Must be exactly as in CH. #  
# Comment out to use the CH defaults. #  
# :n: specifies which process. #  
# : means to apply to all processes. #  
#####
```

# Batch file in details(4)

```
#Kinematics :1: 12 -> 34 , 56
#Kinematics :1: 34 -> 3 , 4
#Kinematics :1: 56 -> 5 , 6

Kinematics : 12 -> 3, 45
Kinematics : 45 -> 4 , 5

#####
# Regularization Info #
# Must be in terms of the final state #
# particles. #
# :n: specifies which process. #
# : means to apply to all processes. #
#####
Regularization momentum:1: 45
Regularization mass:1: Mh
Regularization width:1: wh
Regularization power:1: 2

#####
# Distribution Info #
# Only 1 dimensional distributions are #
# currently supported. #
# Dist n bins should be one of: #
# 300, 150, 100, 75, 60, 50, 30, 25, #
# 20, 15, 12, 10, 6, 5, 4, 3, 2 #
# Dist title and Dist x-title should be #
# plain text. #
#####
Dist parameter: M(b,B)
Dist min: 100
Dist max: 200
Dist n bins: 100
Dist title: p,p->W,b,B
Dist x-title: M(b,B) (GeV)
```

```
Dist parameter: M(W,jet)
Dist min: 100
Dist max: 200
Dist n bins: 100
Dist title: p,p->W,b,B
Dist x-title: M(W,jet) (GeV)

#####
# Events Generation #
# Number of events determines how many #
# events to produce for each run. #
# Filename is the name used for the event #
# files. If no parameter is run over #
# then, -Single.lhe is appended. If #
# a parameter is run over then its #
# value will be appended as in #
# pp-WW-MW400.lhe. #
# NTuple determines whether PAW ntuples #
# are created. This only works if #
# nt_maker is properly compiled and #
# in the bin directory. #
# Choices are True or False. #
# Cleanup determines whether the #
# individual event files are removed #
# after they are combined. #
# Default: True #
#####
Number of events (per run step): 1000
Filename: test
NTuple: False
Cleanup: False
```

# Batch file in details(5)

```
#####  
# Parallelization Info #  
# Parallelization method choices: #  
# local #  
# pbs #  
# Que can be left blank if not required #  
# on your pbs cluster. #  
# Walltime should be the number #  
# of hours necessary for each job. #  
# Leave blank if your pbs cluster does #  
# not require this and will let a #  
# job run until it is finished. #  
# Memory is the amount of memory required #  
# for each job in gb. Leave blank #  
# if not required on your cluster. #  
# email is only used on the pbs cluster #  
# if you want it to inform you of #  
# problems. email is currently ignored. #  
# sleep time determines how often the #  
# script updates (in seconds) #  
# while waiting for processes to finish. #  
# nice level is used for the CH jobs in #  
# local mode and combining events in #  
# all modes. #  
# default: 19 #  
#####  
Parallelization method: local  
#Que: brody_main  
#Walltime: 0.15  
#Memory: 1  
#email: name@address  
Max number of cpus: 2  
sleep time: 3  
nice level : 19
```

```
#####  
# Vegas #  
# The variables are the same as in the gui. #  
# If commented out, the default values #  
# are used. #  
# #  
# nSess_1 : number of the 1st sessions #  
# default: 5 #  
# nCalls_1 : number of calls per 1st sessions #  
# default: 10000 #  
# nSess_2 : number of the 2nd sessions #  
# default: 0 #  
# nCalls_2 : number of calls per 2nd sessions #  
# default: 10000 #  
#####  
nSess_1: 5  
nCalls_1: 100000  
nSess_2: 5  
nCalls_2: 100000  
  
#####  
# Event Generator #  
# The variables are the same as in the gui. #  
# If commented out, the default values #  
# are used. #  
# #  
# sub-cubes: #  
# default: 1000 #  
# random search: #  
# default: 100 #  
# simplex search: #  
# default: 50 #  
# #  
# MAX*N: integer to multiply max by #  
# default: 2 #  
# find new MAX: #  
# default: 100 #  
#####  
-----  
#sub-cubes: 100000  
#random search: 100  
#simplex search: 50  
  
#MAX*N: 2  
#find new MAX: 100
```

# Tutorial

HEPMDB High Energy Physics Models DataBase

Search in HEPMDB Show All Models

User: Alexander Belyaev | Logout

Menu Go to HEPMDB Help

### Calcchep

Validation

ID	File Name
1	Standard Model(CKM=1)

### Validation

Job #1628195.blue30=====Wednesday 01st of August 2012 09:55:37 PM=====

CalcHEP Numerical Details

Done!

Scans	sigma (fb)	Running	Finished	Time (hr)	N events
Mh120	9.8870e+02	0/13	13/13	0.01	10000
Mh125	9.7740e+02	0/13	13/13	0.01	10000
Mh130	9.6810e+02	0/13	13/13	0.02	10000
				0.04	

Mh120.txt CalcHEP Numerical Details

Done!

Processes	sigma (fb)	unc (%)	PID	Time (hr)	N events
u, D -> W+, b, B	1.3296e+03	4.59e-01	0	0.00	3258/3258
U, d -> W-, b, B	7.2163e+02	5.03e-01	0	0.00	1822/1822
d, U -> W-, b, B	7.1638e+02	4.39e-01	0	0.00	1810/1810

### Message

01/08/12 : 21:56:05 : Nt\_maker test-Mh120.lhe  
01/08/12 : 21:56:04 : gunzip file test-Mh120.lhe.gz  
01/08/12 : 21:55:38 : Job 1628195.blue30 was finished.  
01/08/12 : 21:38:29 : You successfully submitted a job on HPCx : #1628195.blue30 . You will be notified by email when the job is finished.

MEFF(GeV)

Download [url] [License] [Pdf]

HEPnet Durham University

# Tutorial

HEPMDB  
High Energy Physics Models DataBase

Search in HEPMDB

HEPMDB  
High Energy Physics Models DataBase

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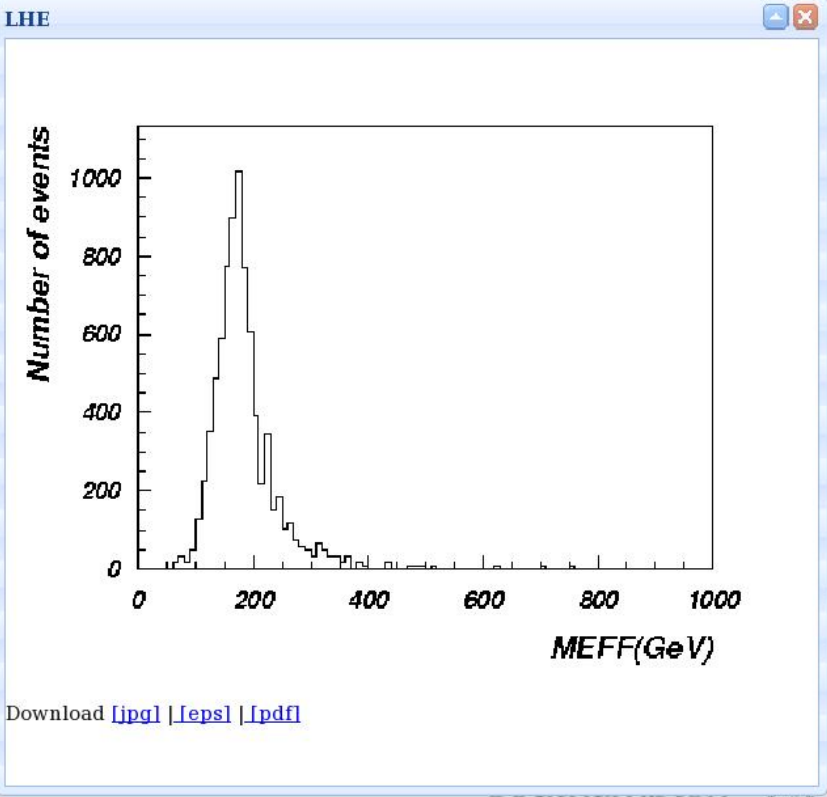
HEPMDB is created to facilitate the connection of models, to develop dictionary of the models expected at the LHC. HEPMDB is also designed for experimental efficiencies. Using this information which would allow to discriminate an unknown signal from the Standard Model. The 'Forum' section is highly appreciated. Data represent themselves a set of Feynman diagrams. CalCHEP, CompHEP, FeynArts, Madgraph, Authors can test and validate their models. We are welcomed to also upload LanHEP or FeynHiggs.

**Validation**

Test and model validation will be available on our site via submitting job. You will allow to run Feynman Rules generators -- 'Forum' section. HEPMDB also collects signatures 'Authors' supposed to assign to their models in the 'Signatures' section. Information and generator is located in the section 'Tools'.

**Validation**

**LHE**



Number of events

MEFF(GeV)

Download [\[jpg\]](#) | [\[eps\]](#) | [\[pdf\]](#)

02/03/12 : 03:26:40 : Nt\_maker test-single.lhe  
02/03/12 : 03:25:51 : You dont have any job  
02/03/12 : 03:25:27 : Logged In.

02/03/12 : 03:21:58 : You successfully sub  
02/03/12 : 03:21:01 : You dont have any jo  
02/03/12 : 03:21:00 : Logged In.

02/03/12 : 03:23:30 : Job 24161 was finished.  
02/03/12 : 03:23:28 : Logged In.

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