High Energy Physics Model Database [HEPMDB] : Practical Introduction

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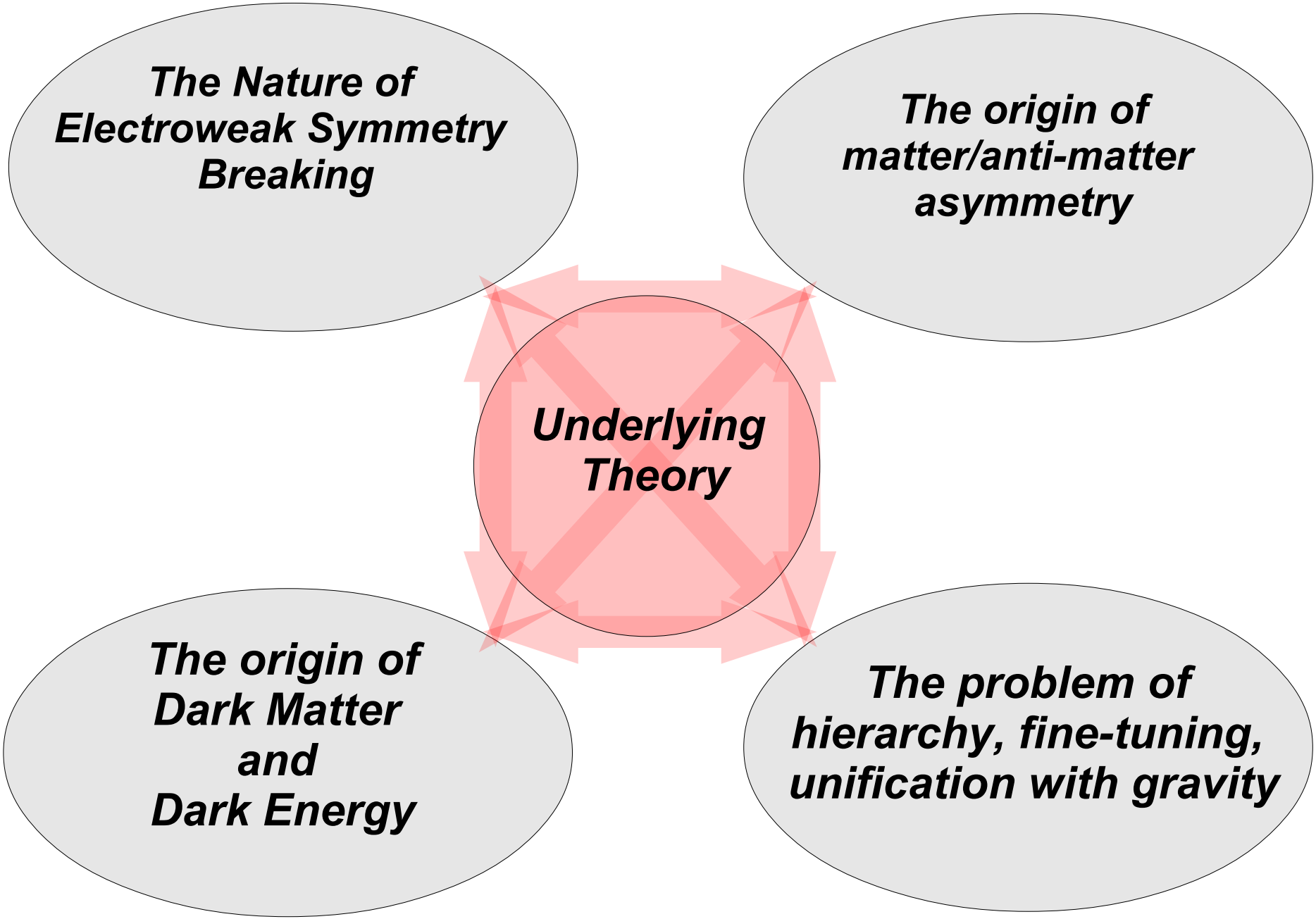
CERN

Matrix Element and Future Generators Meeting

August 22, 2013

What underlying theory should explain?



Promising candidates for underlying theory

- ***Supersymmetry:***
  - ***cMSSM, MSSM, NMSSM, E_6SSM, ...***
- ***Walking Technicolor***

  (including DM candidate)

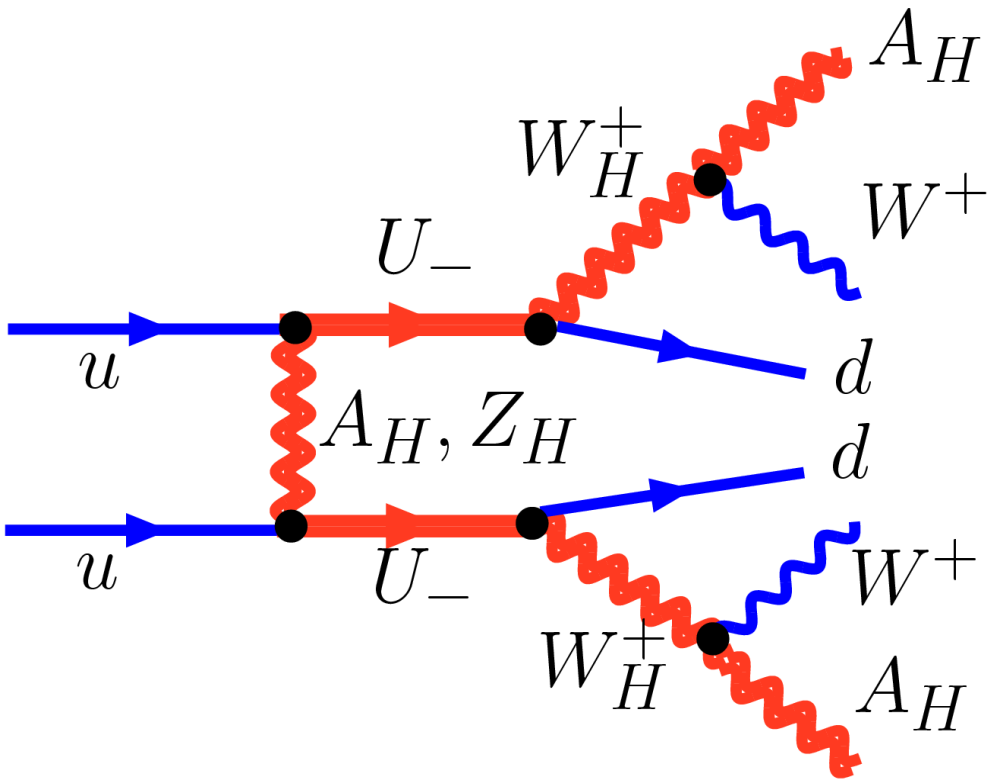
- ***Extradimensional Models:***
  - ***Universal and Warped extra dimensions***

.....

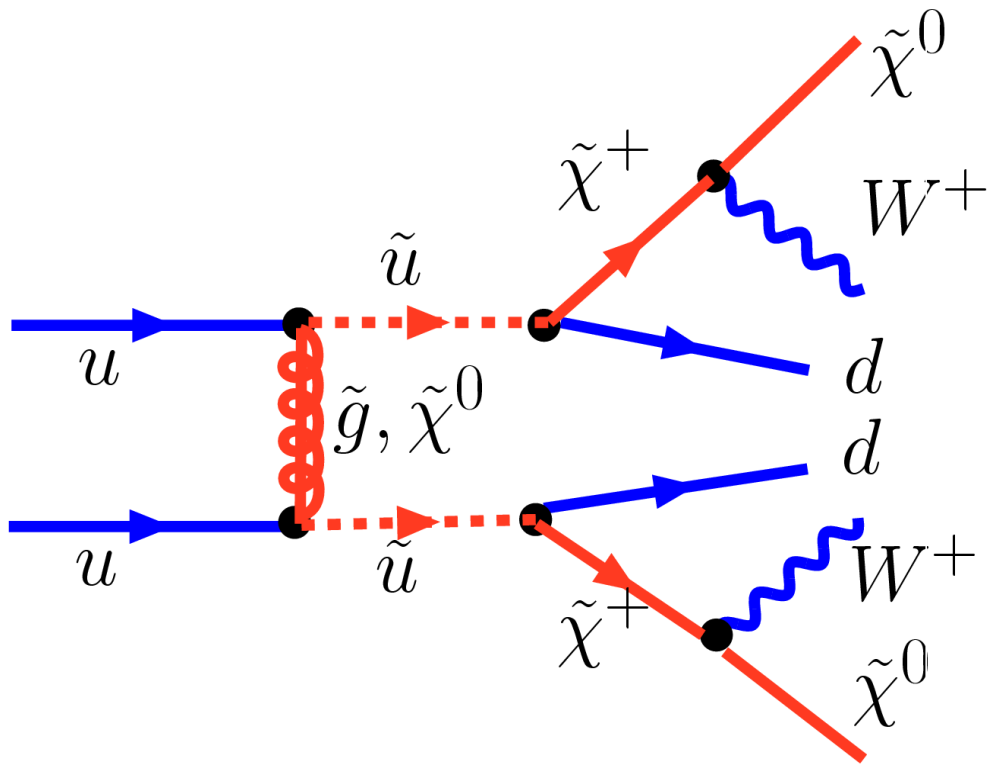
.....

.....

Signatures could look alike



LHT



SUSY

It was realised that
"Dictionary of the LHC Signatures"

AB, Datta, De Roeck, Godbole, Mellado, Nyffeler, Petridou, D.P. Roy, Pramana 72:229-238,2009. e-Print: arXiv:0806.2838 [hep-ph]

in the form of various tables is not enough to accommodate all models and their signatures

We need dictionary in the form of the Model Database and their Signatures

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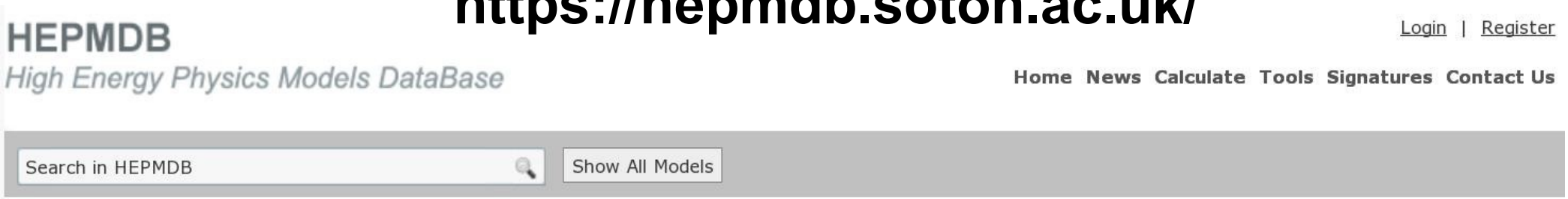
in the form of various tables is not enough to accommodate all models and their signatures

We need dictionary in the form of the Model Database and their Signatures

High Energy Physics Model Database [HEPMDB]

High Energy Physics Model Database

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



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.

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

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

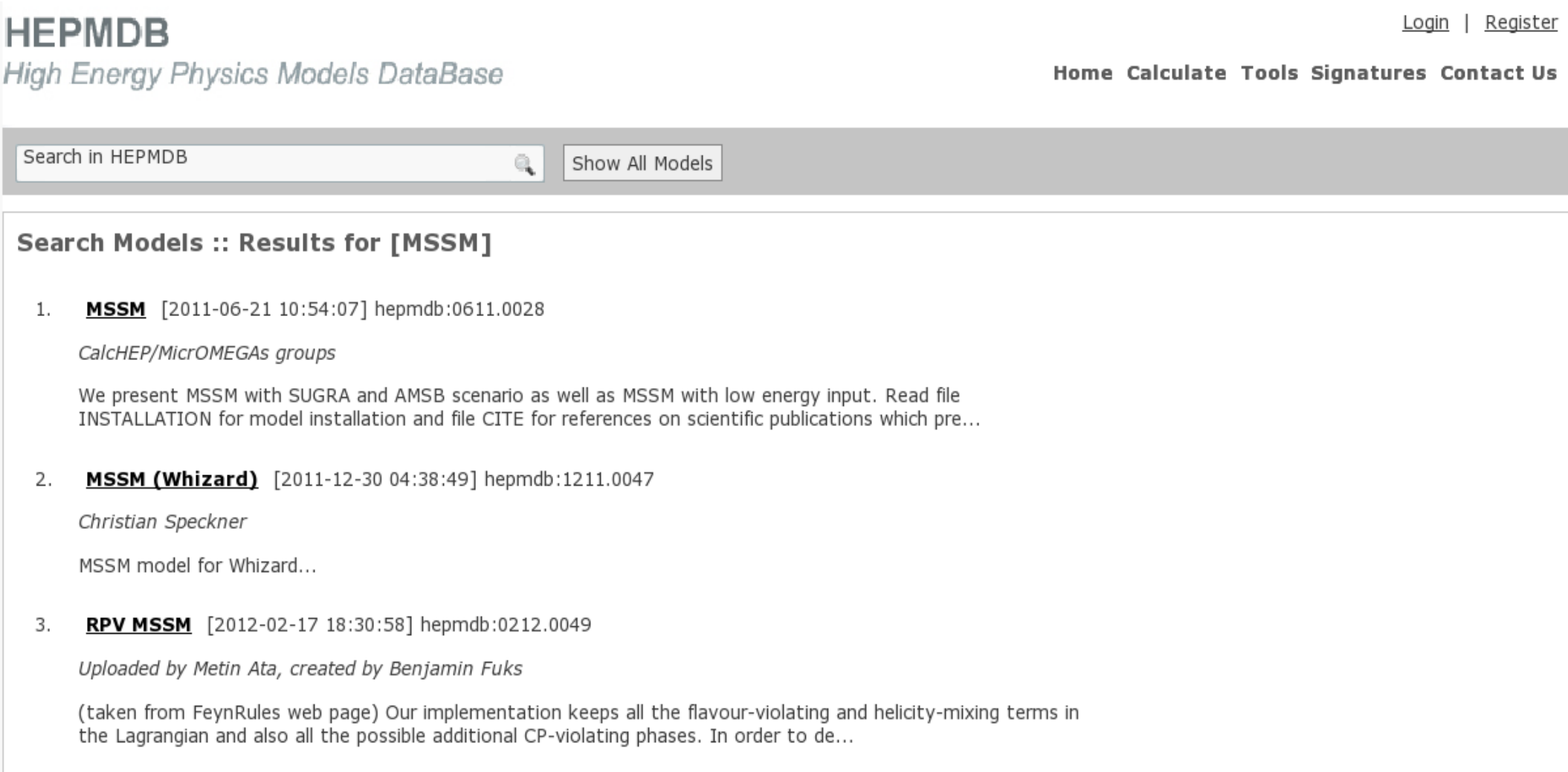
- **allows users to upload *their own models,* perform evaluation MEand event generation HPC cluster behind the HEPMDB.**
  This is one of the very powerful features of the HEPMDB: it provides a web interface to various ME generators which can then also be run directly on the HPC cluster. This way, users can preform 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



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

Model : MSSM

http://hepmdb.soton.ac.uk/hepmdb:0611.0028

Authors

CalcHEP/MicrOMEGAs groups

Added By

Alexander Belyaev

References

G.~Belanger, F.~Boudjema, A.~Pukhov and A.~Semenov, Comput. Phys. Commun. 174, 577 (2006)[arXiv:hep-ph/0405253]
A.~Djouadi, J.~L.~Kneur and G.~Moultaka, arXiv:hep-ph/0211331

Abstract

Updated MSSM model for CalcHEP is uploaded (bug for SC constant in the file with dependences is corrected)

Information

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 present realization of the model.

Tools

CalcHEP [model]

Model History

2011-12-02 15:01:19
2011-10-14 13:40:10

Download Model File | Validate Model on HPCx | Edit Model

Reviews

Matrix element and cs evaluation as event generation at HEPMDB

- allows to the 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

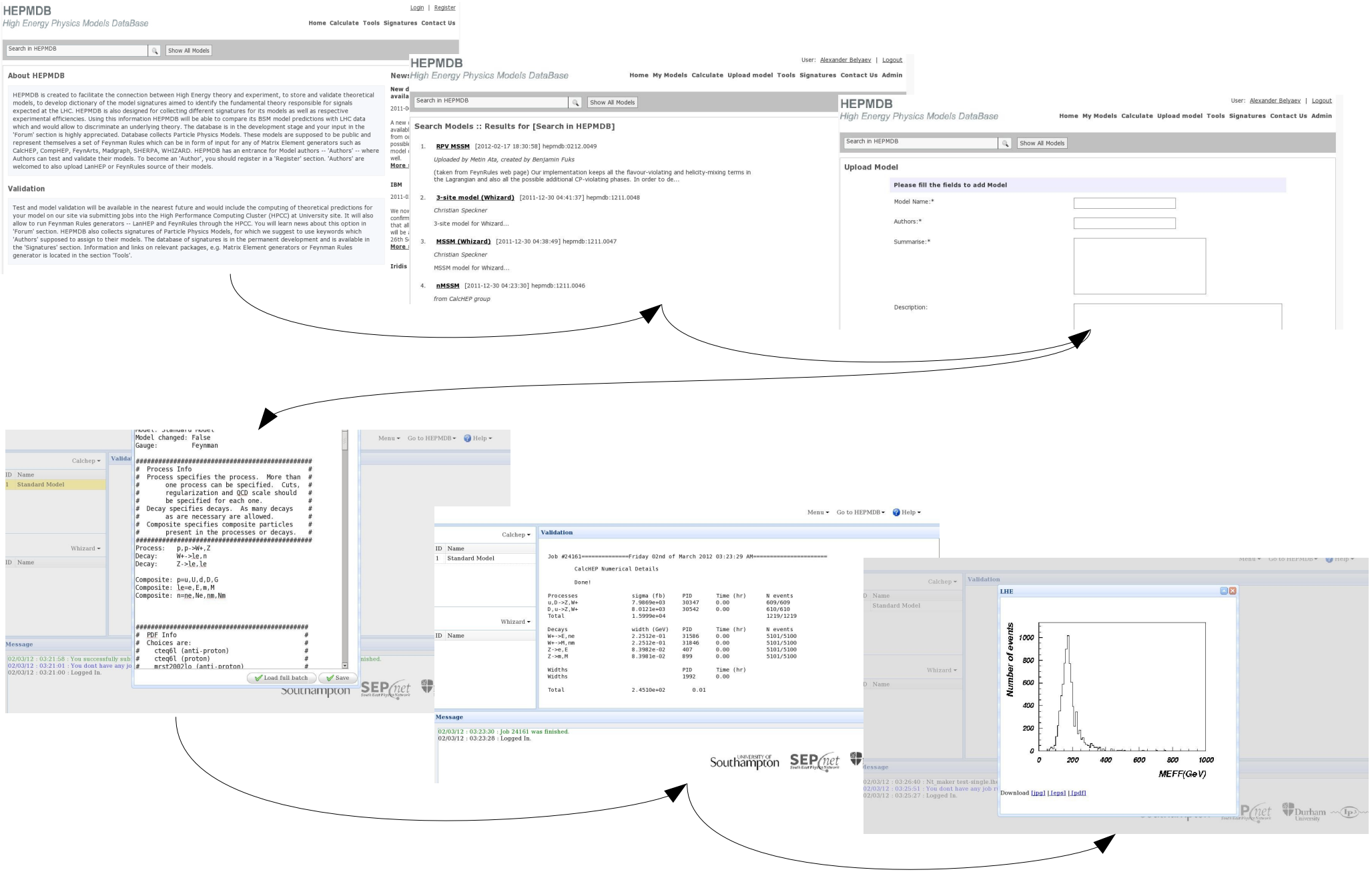
Future prospects for HEPMDB

- 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 will be installed 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


HEPMDB
High Energy Physics Models DataBase
Home Calculate Tools Signatures Contact Us
About HEPMDB
Validation
Search Models :: Results for [Search in HEPMDB]
Upload Model
Please fill the fields to add Model
Model Name:*
Authors:*
Summarise:*
Description:
Validation
LHE
Number of events
MEFF(GeV)

Tutorial

HEPMDB

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Search in HEPMDB | Show All Models

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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 »

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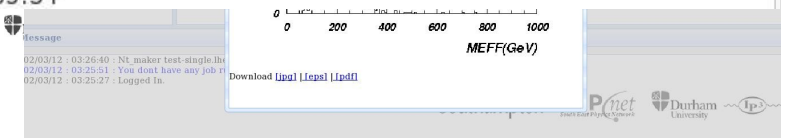
2012-03-25 12:55:34



Tutorial

HEPMDB
High Energy Physics Models DataBase

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Search in HEPMDB

Show All Models

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

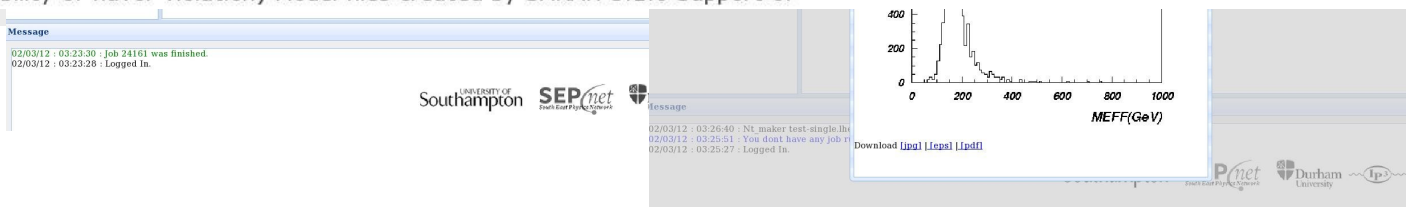
   Florian Staub

   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

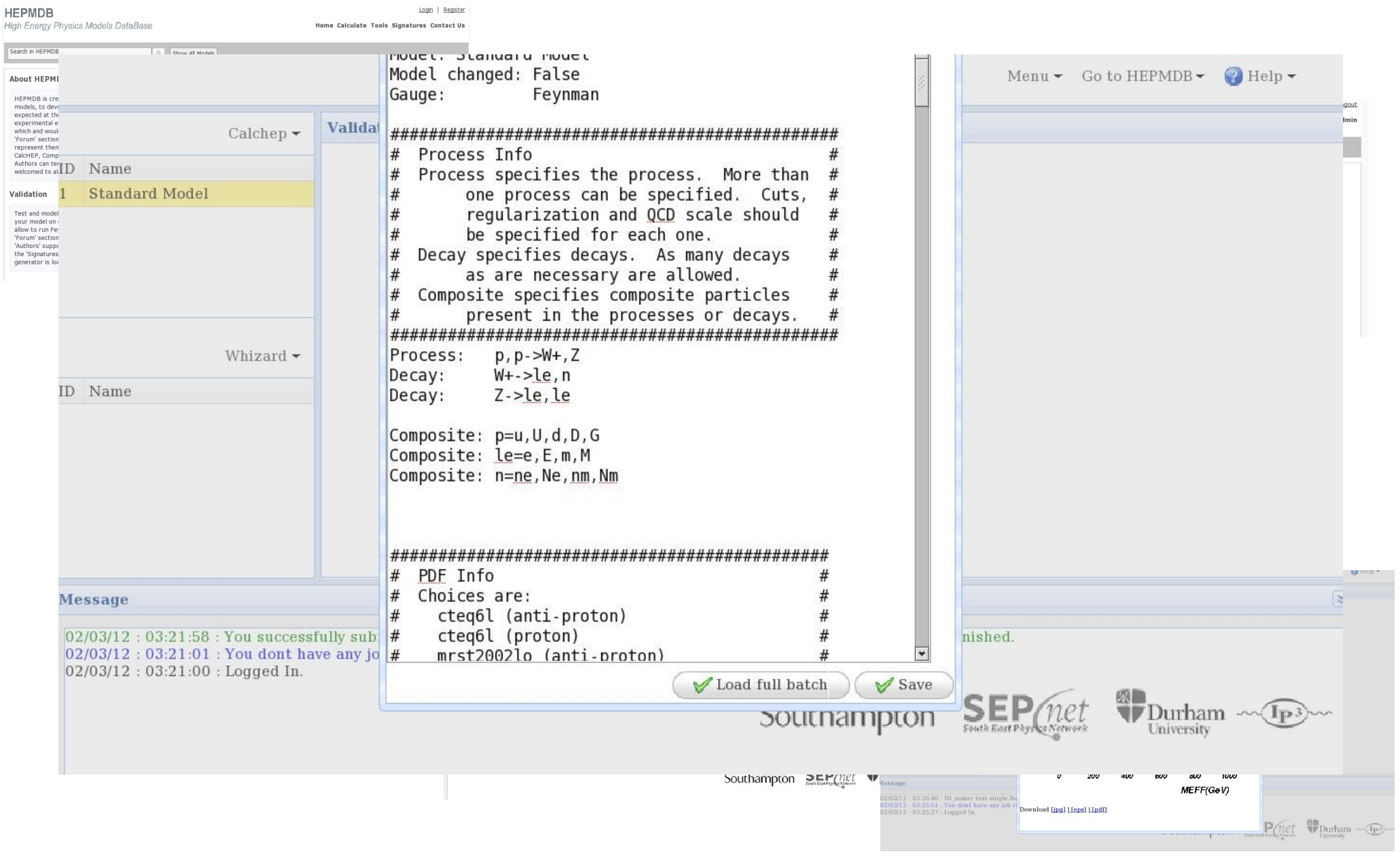
   Triplet extended MSSM (including possibility of flavor violation) Model files created by SARAH 3.1.0 Support of



Tutorial


HEPMDB
High Energy Physics Models DataBase
Home My Models Calculate Upload model Tools Signatures Contact Us Admin
User: Alexander Belyaev | Logout
Search in HEPMDB
Show All Models
Upload Model
Please fill the fields to add Model
Model Name:*
Authors:*
Summarise:*
Description:
Message
02/03/12 : 03:23:30 : Job 24161 was finished.
02/03/12 : 03:23:28 : Logged In.
Southampton
SEPnet
Durham University

Tutorial


HEPMDB
High Energy Physics Models DataBase
Login | Register
Home Calculate Tools Signatures Contact Us
Menu
Go to HEPMDB
Help
Calchep
Whizard
ID Name
1 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
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.
Southampton
SEPnet South East Physics Network
Durham University
Ip3
MEFF(GeV)

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)
```

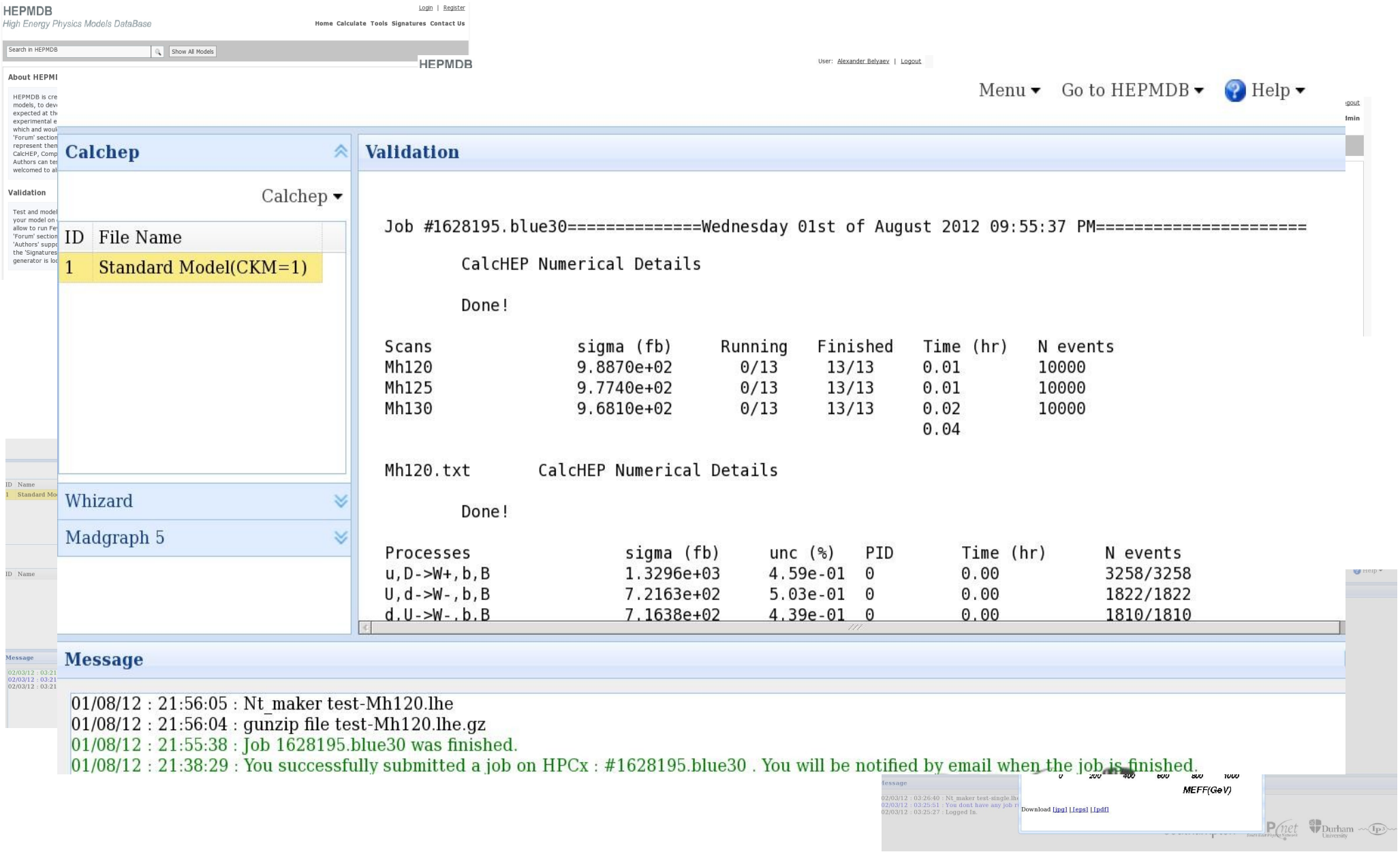
```
Dist parameter:    M(W,jet)
Dist min:          100
Dist max:          200
Dist n bins:       100
Dist title:        p,p->W,b,B
Dist x-title:      M(W,jet) (GeV)

#################################################
#  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)

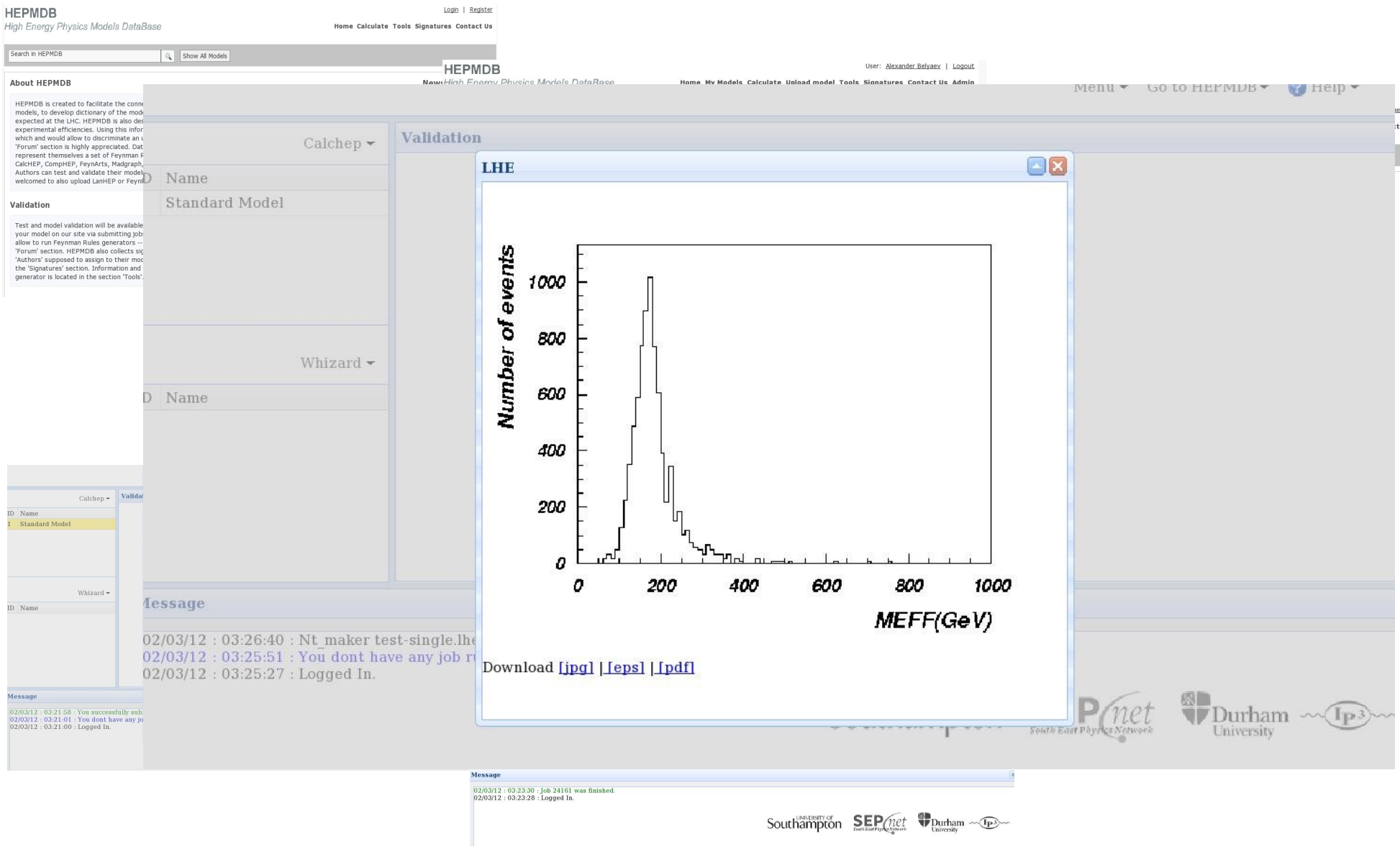
```
################################################
#  Parallelization Info                        #
#  Parallelization method choices:             #
#      local                                   #
#      pbs                                     #
#  Que can be left blank if not required       #
#      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
Login | Register
Home Calculate Tools Signatures Contact Us
Search in HEPMDB
Show All Models
HEPMDB
User: Alexander Belyaev | Logout
Menu
Go to HEPMDB
Help
Calchep
Calchep
ID File Name
1 Standard Model(CKM=1)
Whizard
Madgraph 5
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)

Tutorial


HEPMDB
High Energy Physics Models DataBase
Home Calculate Tools Signatures Contact Us
About HEPMDB
Validation
Calchep
Whizard
Name
Standard Model
LHE
Number of events
MEFF(GeV)
Download [jpg] | [eps] | [pdf]
Message
02/03/12 : 03:26:40 : Nt_maker test-single.lhe
02/03/12 : 03:25:51 : You dont have any job r
02/03/12 : 03:25:27 : Logged In.
02/03/12 : 03:23:30 : Job 24161 was finished.
02/03/12 : 03:23:28 : Logged In.
Durham University

Example of models created for CalcHEP

- **SM + extensions**
  - SM
  - B-L symmetric Z' with heavy Majorana neutrinos
  - SM + Z'
  - general 2 Higgs doublet model
  - 4th generation
  - Excited fermions
  - Model with contact interactions
  - Standard Model + anomalous gauge boson couplings
  - Model of strongly int EW sector
    (5 & 6 dim operators involving Sigma field)
- **SUSY**
  - constraint MSSM
  - general MSSM, with 124 free parameters
  - NMSSM
  - RPVMSSM
  - left-right symmetric MSSM
  - MSSM with CP violation
  - E6MSSM
- **Extra dimensions**
  - 5D UED with 2KK layers
  - 6D UED with 2KK layers
  - ADD = ADD
  - RS = Randall Sundrum
- **Leptoquarks**
  - Complete LQ model
    SU(3)xSU(1)xU(1) vector&scalar
- **Technicolor & Higgsless**
  - Minimal walking technicolor
  - TC with DM
  - 3-site model
  - Hidden Local symmetry model
  - 4SM = general 4-site model
- **Little Higgs**
  - Littlest higgs model with T-parity
  - LHT + T-parity violation

Models at FeynRules web-site

Standard Model	The SM implementation of FeynRules, included into the distribution of the FeynRules package.
Simple extensions of the SM (10)	Several models based on the SM that include one or more additional particles, like a 4th generation, a second Higgs doublet or additional colored scalars.
Supersymmetric Models (4)	Various supersymmetric extensions of the SM, including the MSSM, the NMSSM and many more.
Extra-dimensional Models (4)	Extensions of the SM including KK excitations of the SM particles.
Strongly coupled and effective field theories (4)	Including Technicolor, Little Higgs, as well as SM higher-dimensional operators.
Miscellaneous (0)	

Remarks on collecting models at HEPMDB

- ***there are numerous model implementations exist (FeynRules team, LanHEP/CalcHEP/CompHEP teams, private implementations)***
- ***they are highly complementary and useful***
- ***HEPMDB is the natural place to accommodate all of them (also allows to keep model privately, controlled by Public/Private option On/Off!)***

Summary on HEPMDB

- HEPMDB is already a convenient centralized storage environment for HEP models. Via web interface to the HPC cluster (12 cores per user) it allows to evaluate the LHC predictions and event generation-simulation chain

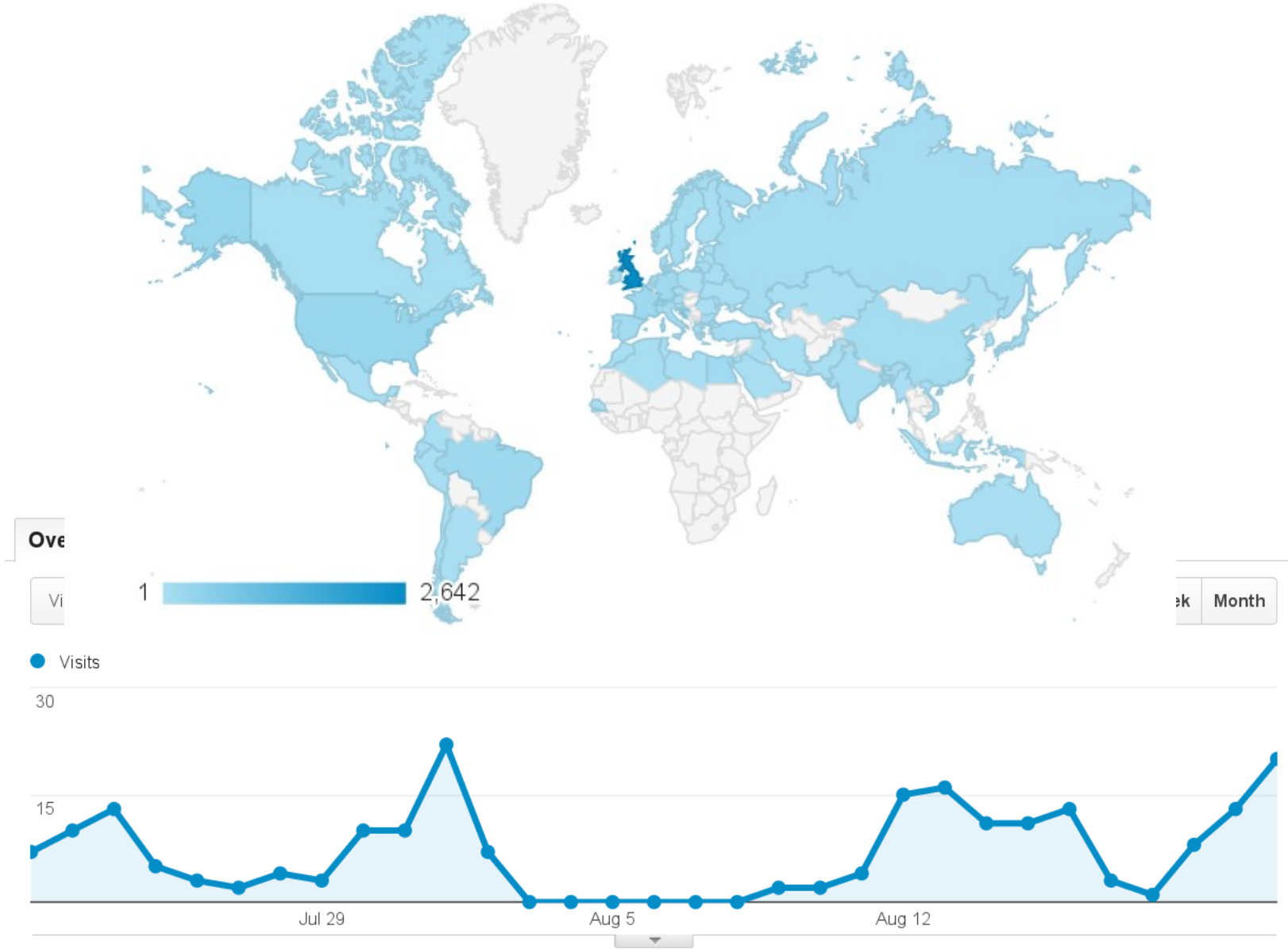
- Your requested packages will be installed at HEPMDB!

- We hope that HEPMDB development will be boosted via your involvement:
  ask questions and report problems using links to launchpad!

For more information about HEPMDB, see our Wiki pages

Ask your question or file the problem at launchpad.

Last year activity: 130 users, 30M events, ~2K visits from over



Last year activity:
~130 users, 30M events, ~2K visits from over 60 countries

Country / Territory	Visits	Pages / Visit	Avg. Visit Duration	% New Visits	Bounce Rate
	5,390 % of Total: **100.00%** (5,390)	**3.61** Site Avg: **3.61** (0.00%)	**00:03:58** Site Avg: **00:03:58** (0.00%)	**24.19%** Site Avg: **24.14%** (0.23%)	**41.60%** Site Avg: **41.60%** (0.00%)
1. United Kingdom	**2,642**	3.87	00:04:28	11.36%	33.84%
2. Switzerland	**411**	3.39	00:02:41	18.73%	33.09%
3. Croatia	**337**	1.19	00:02:11	0.30%	85.76%
4. United States	**267**	3.13	00:02:23	45.69%	44.94%
5. France	**197**	3.10	00:03:20	30.46%	51.27%
6. Brazil	**186**	4.69	00:08:58	38.71%	31.18%
7. Germany	**165**	3.44	00:01:57	44.24%	38.18%
8. Egypt	**139**	4.54	00:05:30	33.81%	46.04%
9. Spain	**110**	3.03	00:02:53	24.55%	70.91%
10. China	**97**	5.60	00:08:35	54.64%	49.48%
11. Russia	**86**	5.12	00:03:43	40.70%	30.23%
12. Bulgaria	**70**	3.04	00:02:58	38.57%	25.71%
13. India	**68**	3.46	00:02:55	75.00%	60.29%
14. Turkey	**61**	3.52	00:04:59	52.46%	47.54%
15. Italy	**52**	6.58	00:06:18	55.77%	46.15%