

PhenoData

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Part of the HEPMDB project

"Decoding new physics from the LHC data", 2nd meeting

PhenoData

(Re)interpreting the results of new physics searches at the LHC, Dec 2016:

To centrally and effectively store data (digitized curves from figures, tables etc) from those HEP papers which do not provide data in arXiv or HEPData, and to avoid duplication of work of HEP researchers on digitizing plots.

Papers list

The screenshot shows the PhenoData website interface. At the top, there is a navigation bar with 'PhenoData', 'Papers', 'Contact', and 'Cite Us'. A search bar contains the text 'Search for paper...'. The user 'Daniel Locke' is logged in. Below the navigation is a blue button that says 'Add PhenoData record for paper »'. A pagination bar shows 'Previous', '1', '2', and 'Next', with 'Showing 0-10 of 14'. The main content area displays a list of four papers, each with a title, abstract, and metadata. The first paper is 'Combination of searches for WW, WZ, and ZZ resonances in pp collisions at sqrt(s) = 8 TeV with the ATLAS detector'. The second is 'Search for diphoton resonances in the mass range from 150 to 850 GeV in pp collisions at sqrt(s) = 8 TeV'. The third is 'Search for resonances in the mass distribution of jet pairs with one or two jets identified as b-jets with the ATLAS detector with 2015 and 2016 data'. The fourth is 'Search for pair production of Higgs bosons in the bbbb final state using proton-proton collisions at sqrt(s) = 1.3 TeV with the ATLAS detector'. Each paper entry includes 'Attachments' and icons for download and delete. At the bottom left, there is a small URL: 'hepmdb.soton.ac.uk/phenodata/upload.php'.

- Listings are created for a paper, and uploads are attached to this.
- Unregistered users may view/download data.
- Inline TeX style formatting supported for all titles, labels, descriptions.

- Document-orientated database MongoDB allows for arbitrary data structure, may be changed over time.

The screenshot shows the PhenoData upload form. It includes a 'Paper Title*' field with a note '(inline LaTeX supported)'. Below it is an 'INSPIREHEP Record ID:' field with the example 'e.g. 1391323'. The 'References:' section has a dropdown menu set to 'Journal' and a '+ New Reference' button. The 'Paper Data*' section has a note 'Upload both table and figure data for your paper here'. It contains three fields: 'Label*' with the example 'eg: 1.1a', 'Data*' with the note 'Any textual format' and a 'Browse...' button, and 'Figure:' with the note 'Optional figure to attach (pdf preferred, image files accepted)' and a 'Browse...' button. Below these fields is a 'Data description here' text area. At the bottom of the form are '+ New Data' and 'Upload' buttons.

Paper view

BETA PhenoData Papers Contact Cite Us

Search for paper... Daniel Locke

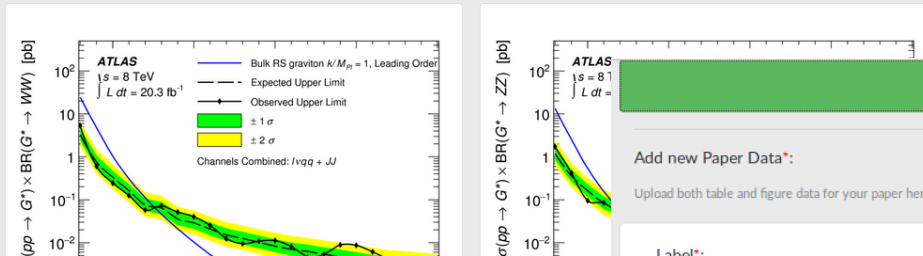
Combination of searches for WW , WZ , and ZZ resonances in pp collisions at $\sqrt{s} = 8$ TeV with the ATLAS detector

arXiv: 1512.05099
inspirehep: 1409918

PhenoData record added by Kimiko Yamashita
07-04-2017 17:30

Add data »

- Edit your own uploads
- May contact uploaders directly or post public comments



Add data »

Add new Paper Data*

Upload both table and figure data for your paper here

Label*:

Data*: No file selected.

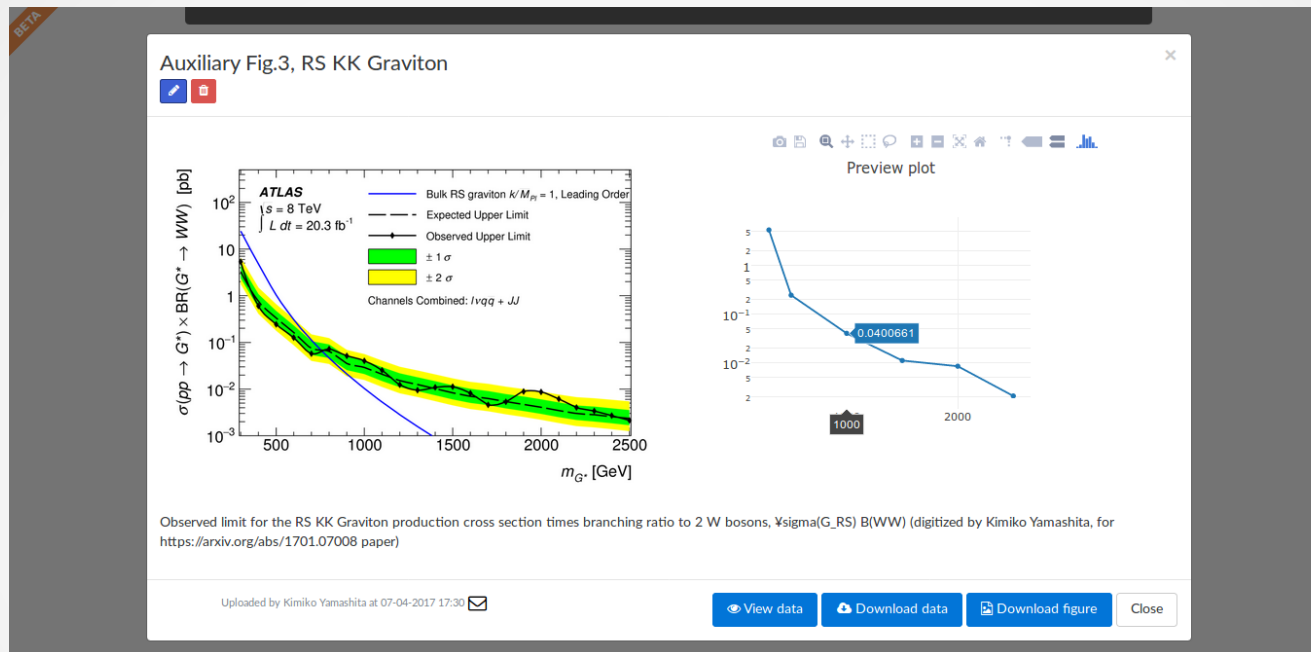
Figure image: No file selected.

Data description here

Upload

- Each attachment must have a label and data
- May also upload an image (.pdf preferred-converted to .png and stored alongside original)

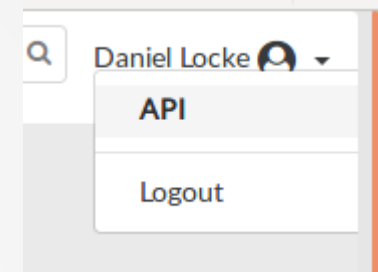
Attachment view



- Uploaded image displayed side-by-side with interactive plot generated from data – check correspondence

API

- RESTful API created to enable batch upload/download of data using simple shell script.
- AUTH_KEY can be found under API tab.
- Help page and examples also under API tab



```
curl "http://hepmdb.soton.ac.uk/phenodata/api/public/upload" \  
-X POST \  
-F "auth_token=AUTH_KEY" \  
-F "id=5878e24ebb81757d03e05a2e" \  
-F "label=Fig 1.1b" \  
-F "description=Test API Upload" \  
-F "upload=@/path/to/data/data.dat" \  
-F "figure=@/path/to/data/figure.jpg"
```

The above command returns JSON structured like this:

```
{  
  "id": "5878e24ebb81757d03e05a2e",  
  "success": true  
}
```

- Attach data to paper using id **or** BibTeX-formatted URL to grab the paper data – will create paper record if does not exist and return in the response

Future Developments

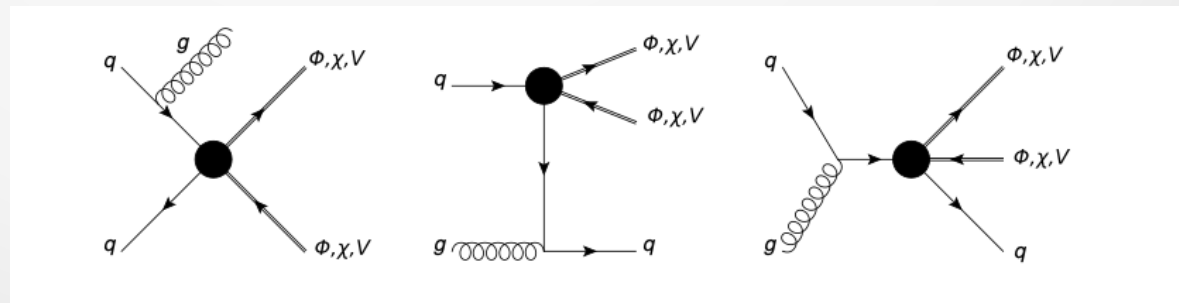
- Automate the digitization of vector graphic plots using pre-existing packages
- Develop tool for digitizing image file plots

DM spin exploration

Dark Matter characterization at the LHC in the Effective Field Theory approach

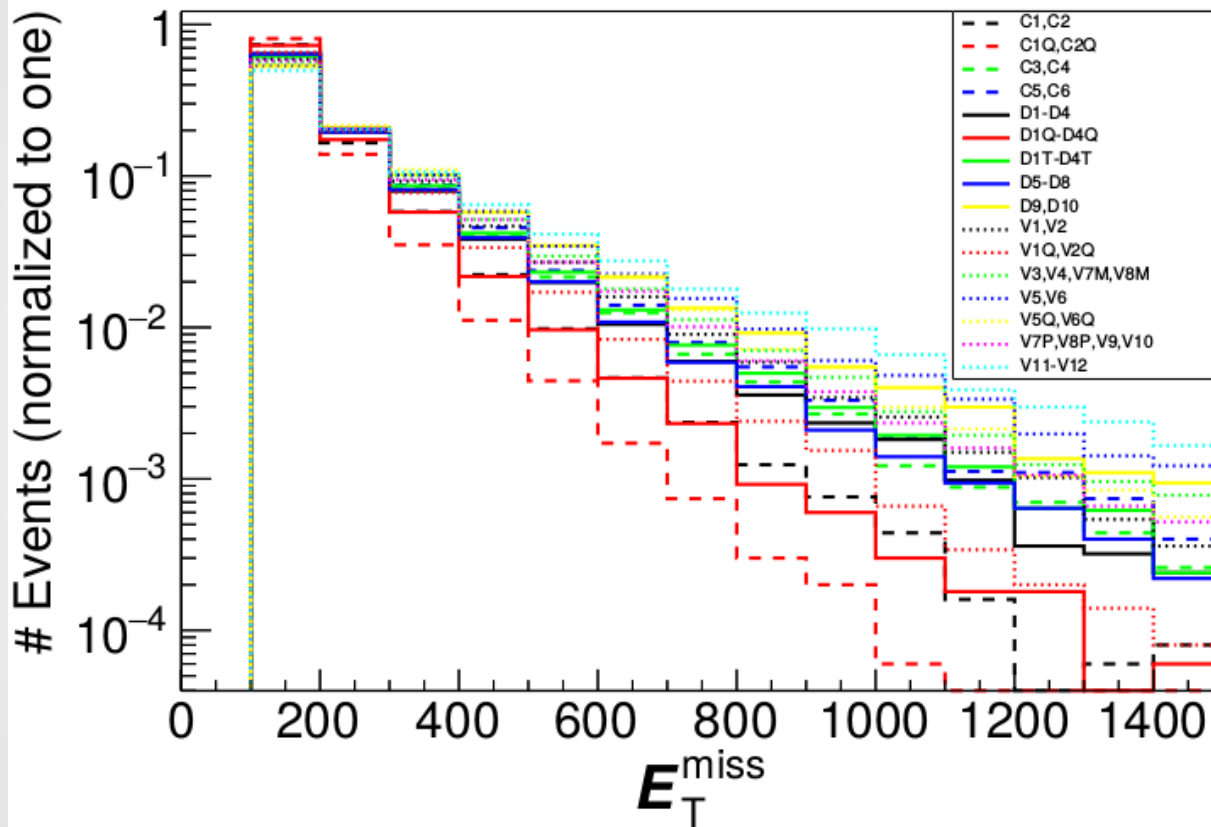
Alexander Belyaev^{a,b,1} Luca Panizzi^{a,b,2} Alexander Pukhov^{c,3} Marc Thomas^{a,b,4}

- dim 5 and 6 effective operators involving interaction of scalar, fermion and vector DM with SM quarks and gluons, compare MET curves from monojet process at LHC for various cases to (attempt to) distinguish these cases



DM spin exploration

$M_{\text{DM}} = 100$, $\sqrt{s} = 13$ TeV



**Recast ATLAS
monojet analysis:**
arxiv.org/abs/1604.07773

- Shape discrimination measured through chi-squared minimized by varying one MET curve w.r.t another

DM spin exploration

- Construct analysis to maximize this minimized chi-squared
- Initial toy optimizes naively and uses only statistical signal error
- Currently:
 - calchep → pythia → delphes
 - Arbitrary rebinning of .root (non-uniform bin widths, any amount)
- Background simulations in progress (to est 95%CL and full stat, syst errors)

