The Durham HepData Project

Durham University

REACTION DATABASE • DATA REVIEWS • PDF PLOTTER ABOUT HEPDATA • SUBMITTING DATA

# HepData status+data

Contact us at: hepdata@projects.hepforge.org

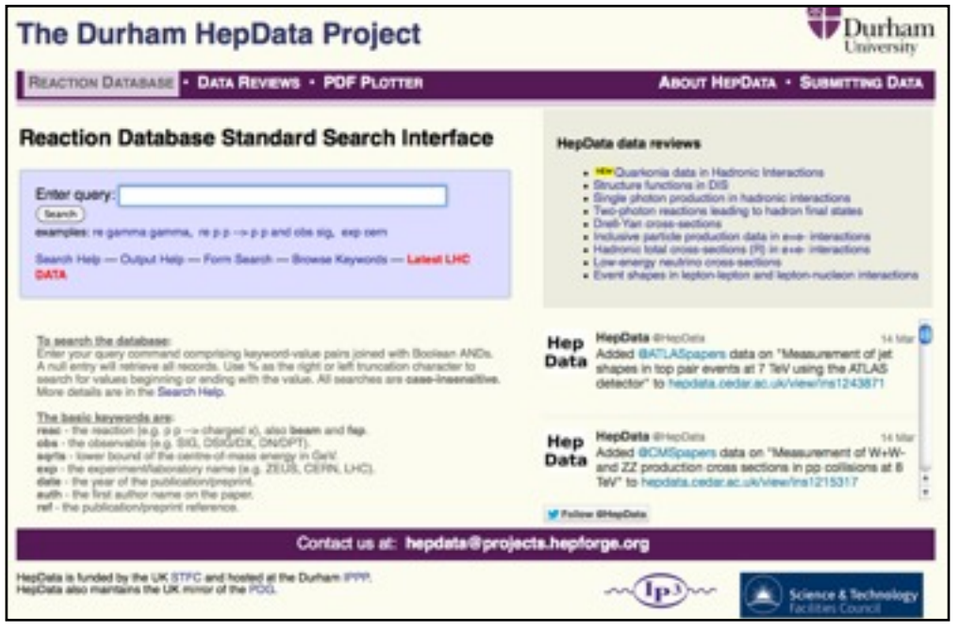
HepData is funded by the UK STFC and hosted at the Durham IPPP.
HepData also maintains the UK mirror of the PDG.

IP3

Science & Technology Facilities Council

Mike Whalley
IPPP Durham U., UK

AAHEP7 Information Provider Summit
Stony Brook - 2nd/3rd April 2014



# Outline of talk

- Brief introduction to HepData with examples
- How does data get into HepData ?
- How should data get into HepData ?
- The HepData-Inspire connection
- Datasets and DOIs
- User/Data statistics
- Summary and Conclusions

# Brief Introduction to HepData

- Purpose - to compile (mainly) published HEP 'cross section' data and make them publicly available.
- Small group, based at the IPPP, Durham U. (UK) -
  - DB Manager/Physicist (MW - retiring)
  - New DB Manager/Physicist (GraemeWatt)
  - Non-Physicist Assistant
- STFC(UK) funded (>30 years) - presently to October 2016.
- 2009 moved to more modern and long-term maintainable computing system.

# What exactly is HepData ?

- DataBase* - essentially of Standard Model cross sections and measurements dating back over 30 years.
- Files** - collections of data of varying format - systematic error breakdowns, correlation matrices, slha files, acceptances, efficiencies, etc....
- Linked together via a Web page
- Different output formats - eg. html, plain text, xml, plots
- Yoda files for Rivet input

* mysql + Java model using Hibernate for database persistency and Tapestry for web pages
** resource area on our main server

# The HepData 'home' page

## The Durham HepData Project

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### Reaction Database Standard Search Interface

Enter query:

Search

examples: re gamma gamma, re p p --> p p and obs sig, exp cern

Search Help — Output Help — Form Search — Browse Keywords — **Latest LHC DATA**

**To search the database:**
Enter your query command comprising keyword-value pairs joined with Boolean ANDs. A null entry will retrieve all records. Use % as the right or left truncation character to search for values beginning or ending with the value. All searches are **case-insensitive**. More details are in the Search Help.

**The basic keywords are:**
**reac** - the reaction (e.g. p p --> charged x), also **beam** and **fsp**.
**obs** - the observable (e.g. SIG, DSIG/DX, DN/DPT).
**sqrts** - lower bound of the centre-of-mass energy in GeV.
**exp** - the experiment/laboratory name (e.g. ZEUS, CERN, LHC).
**date** - the year of the publication/preprint.
**auth** - the first author name on the paper.
**ref** - the publication/preprint reference.

**HepData data reviews**

- NEW Quarkonia data in Hadronic Interactions
- Structure functions in DIS
- Single photon production in hadronic interactions
- Two-photon reactions leading to hadron final states
- Drell-Yan cross-sections
- Inclusive particle production data in e+e- interactions
- Hadronic total cross-sections (R) in e+e- interactions
- Low-energy neutrino cross-sections
- Event shapes in lepton-lepton and lepton-nucleon interactions

HepData @HepData 14 Mar
Added @ATLASpapers data on "Measurement of jet shapes in top pair events at 7 TeV using the ATLAS detector" to hepdata.cedar.ac.uk/view/ins1243871

HepData @HepData 14 Mar
Added @CMSpapers data on "Measurement of W+W- and ZZ production cross sections in pp collisions at 8 TeV" to hepdata.cedar.ac.uk/view/ins1215317

Follow @HepData

Contact us at: hepdata@projects.hepforge.org

Twitter for communication

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HepData also maintains the UK mirror of the PDG.

IP3

Science & Technology Facilities Council

# Initial search results

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### Reaction Database Search Result

Search: **exp lhc**
Result: **261** documents found (displaying **1** to **20**) First | Previous | Next | Last | All

Enter query: exp lhc Search again
...need help with searching?

1. **AAD 2014** – Experiment: **CERN-LHC-ATLAS** (ATLAS)
Preprint: **CERN-PH-EP-2013-184** Archive: **ARXIV:1401.2831**
***Measurement of the production cross section of prompt J/psi mesons in association with a W boson in pp collisions at sqrt(s) = 7 TeV with the ATLAS detector***
Full data record | Short data record | **INSPIRE** | **CDS**

2. **ABELEV 2014** – Experiment: **CERN-LHC-ALICE** (ALICE)
Preprint: **CERN-PH-EP-2013-230** Archive: **ARXIV:1401.1250**
***Production of charged pions, kaons and protons at large transverse momenta in pp and Pb-Pb collisions at sqrt(sNN) = 2.76 TeV***
Full data record | Short data record | **INSPIRE** | **CDS**

3. **AAD 2013** – Experiment: **CERN-LHC-ATLAS** (ATLAS)
Preprint: **CERN-PH-EP-2013-192** Archive: **ARXIV:1312.3524**
***Measurement of dijet cross sections in pp collisions at 7 TeV centre-of-mass energy using the ATLAS detector***
Full data record | Short data record | **INSPIRE** | **CDS**

4. **CHATRCHYAN 2014** – Experiment: **CERN-LHC-CMS** (CMS)
Published: **PL B729,149 (2014)** Preprint: **CERN-PH-EP-2013-215** Archive: **ARXIV:1311.7667**
***Inclusive search for a vector-like T quark with charge 2/3 in pp collisions at sqrt(s) = 8 TeV***
Full data record | Short data record | **INSPIRE** | **CDS**

5. **AAD 2013** – Experiment: **CERN-LHC-ATLAS** (ATLAS)

# Example of a HepData record

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### Reaction Database Full Record Display

View short record or as: input, plain text, AIDA, PyROOT, YODA, ROOT, mpl, ScaVis or MarcXML

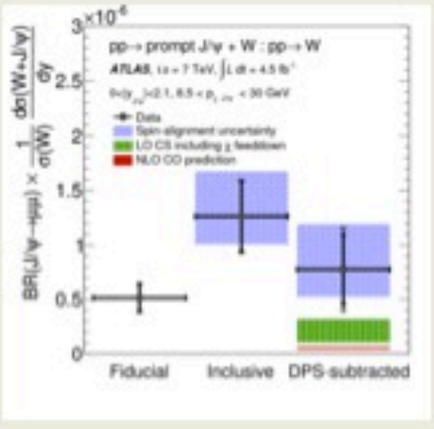
**AAD 2014 — Measurement of the production cross section of prompt J/psi mesons in association with a W boson in pp collisions at sqrt(s) = 7 TeV with the ATLAS detector**

Experiment: CERN-LHC-ATLAS (ATLAS)
Preprinted as CERN-PH-EP-2013-184
Archived as: ARXIV:1401.2831
Auxiliary Material: http://atlas.web.cern.ch/Atlas/GROUPS/PHYSICS/PAPERS/BPHY-2012-06/
Record in: INSPIRE
Record in: CERN Document Server

CERN-LHC. The process P P --> W J/PSI X provides a powerful probe of the production mechanism of charmonium in hadronic collisions, and is also sensitive to multiple parton interactions in the colliding protons. Using the 2011 ATLAS dataset of 4.5 fb^-1 of sqrt(s) = 7 TeV pp collisions at the LHC, the first observation is made of the production of W + prompt J/psi events in hadronic collisions, using W --> MU NU and J/PSI --> MU MU. A yield of 27.4 +7.5,-6.5 W + prompt J/psi events is observed, with a statistical significance of 5.1 sigma. The production rate as a ratio to the inclusive W boson production rate is measured, and the double parton scattering contribution to the cross section is estimated.

Table 1 ( Figure 5. ) HIDE DATA or as: input, plain text, AIDA, PyROOT, YODA, ROOT, mpl, ScaVis or MarcXML
The W + prompt J/psi to inclusive W production cross-section ratio (times 10^6) in the J/psi fiducial region (Fiducial), after correction for J/psi acceptance (Inclusive), and after subtraction of the double parton scattering component (DPS-subtracted). The first uncertainty is statistical, the second is systematic, and the third/fourth (where applicable) is the uncertainty up/down due to spin-alignment.

| | |
|---|---|
| ABS(YRAP(J/PSI)) | 0.0-2.1 |
| PT(J/PSI) | 8.5-30.0 GeV |
| RE | P P --> W+ < MU+ NU > J/PSI < MU+ MU- > X |
| RE | P P --> W- < MU- NUBAR > J/PSI < MU+ MU- > X |
| SQRT(S) | 7000.0 GeV |
| Ratio | 10**6 * BR(J/PSI --> MU+ MU-) * 1/SIG(W) * D(SIG(W JPSI))/DYRAP(J/PSI) |
| Fiducial | 0.51 ± 0.13 (stat) ± 0.04 (sys) |
| Inclusive | 1.26 ± 0.32 (stat) ± 0.09 (sys) +0.41,-0.25 (sys,spin-alignment) |
| DPS-subtracted | 0.78 ± 0.32 (stat) ± 0.22 (sys) +0.41,-0.25 (sys,spin-alignment) |



# another example....

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### Reaction Database Full Record Display

View short record or as: input, plain text, AIDA, PyROOT, YODA, ROOT, mpl, ScaVis or MarcXML

### ABELEV 2014 — Production of charged pions, kaons and protons at large transverse momenta in pp and Pb-Pb collisions at sqrt(sNN) = 2.76 TeV

Experiment: CERN-LHC-ALICE (ALICE)
Preprinted as CERN-PH-EP-2013-230
Archived as: ARXIV:1401.1250
Record in: INSPIRE
Record in: CERN Document Server

CERN-LHC. Measurement of transverse momentum (pT) spectra of charged pions, kaons and protons up to pT = 20 GeV at mid-rapidity in Pb-Pb and pp collisions at sqrt(sNN) = 2.76 TeV, recorded in 2010 and 2011, respectively, using the ALICE detector at the LHC. At intermediate pT (2-8 GeV) an enhancement of the proton-to-pion ratio with respect to pp collisions is observed and the ratio reaches ~0.80 in central Pb-Pb collisions. The measurement of the nuclear modification factors for charged pions, kaons and protons indicates that within the systematic and statistical uncertainties they are the same at high pT (> 10 GeV).

Table 1 ( Figure 2 (left). ) HIDE DATA or as: input, plain text, AIDA, PyROOT, YODA, ROOT, mpl, ScaVis or MarcXML
Invariant yields of identified pions in central and peripheral Pb-Pb collisions, together with the unscaled pp reference yields.

| CENTRALITY | 0 TO 5 pct | 60 TO 80 pct | - |
|---|---|---|---|
| ETARAP | -0.8-0.8 | | |
| RE | PB PB --> (PI+ + PI-) X | PB PB --> (PI+ + PI-) X | P P --> (PI+ + PI-) X |
| SQRT(S)/NUCLEON | 2760.0 GeV | | |
| PT IN GEV | 1/(Nev*2*PI*PT)*D2(N)/DPT/DYRAP IN GEV**-2 | | |
| 2.0 – 2.2 | 2.302 ± 0.004 (stat) ± 0.210 (sys) | 0.06735 ± 0.00025 (stat) ± 0.00714 (sys) | 0.003910 ± 0.000011 (stat) ± 0.000319 (sys) |
| 2.2 – 2.4 | 1.345 ± 0.002 (stat) ± 0.122 (sys) | 0.04154 ± 0.00016 (stat) ± 0.00439 (sys) | 0.002432 ± 0.000008 (stat) ± 0.000199 (sys) |
| 2.4 – 2.6 | 0.8011 ± 0.0015 (stat) ± 0.0728 (sys) | 0.02617 ± 0.00011 (stat) ± 0.00276 (sys) | 0.001539 ± 0.000006 (stat) ± 0.000126 (sys) |
| 2.6 – 2.8 | 0.4828 ± 0.0009 (stat) ± 0.0438 (sys) | 0.01694 ± 0.00008 (stat) ± 0.00179 (sys) | 0.001011 ± 0.000004 (stat) ± 0.000083 (sys) |
| 2.8 – 3.0 | 0.2960 ± 0.0006 (stat) ± 0.0268 (sys) | 0.01124 ± 0.00006 (stat) ± 0.00118 (sys) | 0.0006816 ± 0.0000043 (stat) ± 0.0000557 (sys) |
| 3.0 – 3.2 | 0.1834 ± 0.0006 (stat) ± 0.0166 (sys) | 0.007594 ± 0.000058 (stat) ± 0.000796 (sys) | 0.0004670 ± 0.0000025 (stat) ± 0.0000382 (sys) |
| 3.2 – 3.4 | 0.1168 ± 0.0004 (stat) ± 0.0106 (sys) | 0.005238 ± 0.000043 (stat) ± 0.000548 (sys) | 0.0003254 ± 0.0000019 (stat) ± 0.0000266 (sys) |

# example showing link to 'resource area' file

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## Reaction Database Full Record Display

View short record or as: input, plain text, AIDA, PyROOT, YODA, ROOT, mpl, ScaVis or MarcXML

### AAD 2013 — Measurement of the high-mass Drell-Yan differential cross-section in pp collisions at sqrt(s)=7 TeV with the ATLAS detector

Experiment: CERN-LHC-ATLAS (ATLAS)
Preprinted as CERN-PH-EP-2013-064
Archived as: ARXIV:1305.4192
Record in: INSPIRE

CERN-LHC. Based on an integrated luminosity of 4.9 /fb, the differential cross-section in the Z/gamma
measured with the ATLAS detector as a function of the invariant mass, Mee, in the range 116 < Mee <
fiducial region in which both the electron and the positron have transverse momentum pT > 25 GeV a
pseudorapidity letal < 2.5..

Link to the full breakdown of the sources of errors

Table 1 ( T 2,F 2,3. ) HIDE DATA or as: input, plain text, AIDA, PyROOT, YODA, ROOT, mpl, S
Measured differential cross sections as a function of the di-electron mass for DY production at the B

| ABS(ETARAP(EE)) | < 2.5 | |
|---|---|---|
| PT(C=E) | > 25 GeV | |
| RE | P P --> E+ E- X | |
| SQRT(S) | 7000.0 GeV | |
| | BORN | DRESSED |
| M(EE) IN GEV | D(SIG)/DM(EE) IN PB/GEV | |
| 116. – 130. | 0.224 ± 1.1% (stat) ± 4.2% (sys) | 0.215 ± 1.1% (stat) ± 4.2% (sys) |
| 130. – 150. | 0.102 ± 1.4% (stat) ± 4.3% (sys) | 0.0984 ± 1.4% (stat) ± 4.3% (sys) |
| 150. – 170. | 0.0512 ± 2.0% (stat) ± 4.6% (sys) | 0.0493 ± 2.0% (stat) ± 4.6% (sys) |

from the database

resource area file

```
Details of the sources of errors for the DY production at both the Born and dressed levels.
ATLAS - CERN-PH-EP-2012-064 - arXiv:1305.4192
Measurement of the high-mass Drell-Yan differential cross-section in pp collisions at sqrt(s)=7 TeV

KEY:
Nbkg            background events uncertainty
CUY             MC statistic uncertainty for bin-by-bin unfolding
Reco.           electron reconstruction uncertainty
Id.             electron identification uncertainty
Energy scale & res  uncertainty of the energy scale and energy resolution
Unfolding       uncertainty of the unfolding method
Trigger         trigger uncertainty
MC modelling    includes all uncertainties of the MC modeling (vertex position, Z pT, pile-up, K-factors)
Theoretical     uncertainty of theoretical extrapolation to the fiducial region
Lumi            luminosity uncertainty

Born level
=============================================================================================================
mee     mee     Stat.   Nbkg    CUY     Nbkg    Reco.   Id.   Energy  Unfolding Trigger MC      Theoretical Lumi
xmin    xmax            stat.   stat.                           scale&res                 modelling
  GeV           <-uncorrelated (%)->  <---------------------bin-to-bin correlated (%)---------------------->
=============================================================================================================
116     130     1.1     0.1     0.7     1.3     1.6     2.3     2.1     1.5     0.8     0.2     0.3     1.8
130     150     1.4     0.2     0.7     1.8     1.6     2.3     1.7     1.5     0.8     0.5     0.2     1.8
150     170     2.0     0.3     1.0     2.5     1.6     2.3     1.6     1.5     0.8     0.2     0.2     1.8
170     190     2.7     0.4     1.3     2.8     1.6     2.3     1.0     1.5     0.8     0.2     0.2     1.8
190     210     3.0     0.5     1.7     3.4     1.6     2.4     1.5     1.5     0.8     0.3     0.4     1.8
210     230     4.4     0.9     2.0     4.1     1.6     2.4     2.0     1.5     0.8     0.8     0.5     1.8
230     250     5.2     0.9     2.4     3.8     1.6     2.4     1.2     1.5     0.8     0.2     0.3     1.8
250     300     4.3     0.7     0.9     4.1     1.6     2.4     1.7     1.5     0.8     0.2     0.2     1.8
300     400     5.1     0.9     1.0     4.4     1.6     2.5     1.7     1.5     0.8     0.3     0.3     1.8
400     500     9.4     2.0     0.9     4.0     1.6     2.6     2.3     1.5     0.8     0.5     0.4     1.8
500     700     11      2.0     0.8     3.1     1.6     2.6     2.4     1.5     0.8     0.2     0.3     1.8
700     1000    24      4.0     0.6     4.3     1.6     2.6     2.8     1.5     0.8     0.2     0.4     1.8
1000    1500    50      7.6     0.4     3.1     1.7     2.5     3.3     1.5     0.8     0.3     0.4     1.8

dressed level
=============================================================================================================
mee     mee     Stat.   Nbkg    CUY     Nbkg    Reco.   Id.   Energy  Unfolding Trigger MC      Theoretical Lumi
xmin    xmax            stat.   stat.                           scale&res                 modelling
  GeV           <-uncorrelated (%)->  <---------------------bin-to-bin correlated (%)---------------------->
=============================================================================================================
116     130     1.1     0.1     0.7     1.3     1.6     2.3     2.1     1.5     0.8     0.2     0.3     1.8
130     150     1.4     0.2     0.7     1.8     1.6     2.3     1.7     1.5     0.8     0.5     0.2     1.8
150     170     2.0     0.3     1.0     2.5     1.6     2.3     1.6     1.5     0.8     0.2     0.2     1.8
170     190     2.7     0.4     1.3     2.8     1.6     2.3     1.0     1.5     0.8     0.2     0.2     1.8
190     210     3.0     0.5     1.7     3.4     1.6     2.4     1.5     1.5     0.9     0.3     0.4     1.8
210     230     4.4     0.9     2.1     4.1     1.6     2.4     2.0     1.5     0.8     0.8     0.5     1.8
230     250     5.2     0.9     2.4     3.8     1.6     2.4     1.2     1.5     0.9     0.2     0.3     1.8
250     300     4.3     0.7     0.9     4.1     1.6     2.4     1.7     1.5     0.8     0.2     0.2     1.8
300     400     5.1     0.9     1.0     4.4     1.6     2.5     1.7     1.5     0.8     0.3     0.3     1.8
400     500     9.4     2.0     0.9     4.0     1.6     2.6     2.3     1.5     0.8     0.5     0.4     1.8
500     700     11      2.0     0.8     3.1     1.7     2.6     2.4     1.5     0.8     0.2     0.3     1.8
700     1000    24      4.0     0.6     4.3     1.7     2.6     2.8     1.5     0.8     0.2     0.4     1.8
1000    1500    50      7.6     0.5     3.1     1.7     2.5     3.3     1.5     0.8     0.3     0.4     1.8
```

# Plotting data within HepData

| | | |
|---|---|---|
| ABS(ETARAP(EE)) | < 2.5 | |
| PT(C=E) | > 25 GeV | |
| RE | P P --> E+ E- X | |
| SQRT(S) | 7000.0 GeV | |
| | BORN | DRESSED |
| M(EE) IN GEV | D(SIG)/DM(EE) IN PB/GEV | |
| 116. – 130. | 0.224 ± 1.1% (stat) ± 4.2% (sys) | 0.215 ± 1.1% (stat) ± 4.2% (sys) |
| 130. – 150. | 0.102 ± 1.4% (stat) ± 4.3% (sys) | 0.0984 ± 1.4% (stat) ± 4.3% (sys) |
| 150. – 170. | 0.0512 ± 2.0% (stat) ± 4.6% (sys) | 0.0493 ± 2.0% (stat) ± 4.6% (sys) |
| | | 0.00165 ± 5.1% (stat) ± 5.9% (sys) |
| | | 0.000458 ± 9.4% (stat) ± 6.3% (sys) |
| | | 0.000141 ± 11.0% (stat) ± 5.7% (sys) |
| | | 0.0000213 ± 24.0% (stat) ± 7.5% (sys) |
| 1000. – 1500. | 0.00000288 ± 50.0% (stat) ± 9.8% (sys) | 0.00000276 ± 50.0% (stat) ± 9.8% (sys) |
| | Plot<br>SelectPlot | Plot<br>SelectPlot |

ermalinks: I by Inspire ID

## Reaction Database Single Dataset Plot

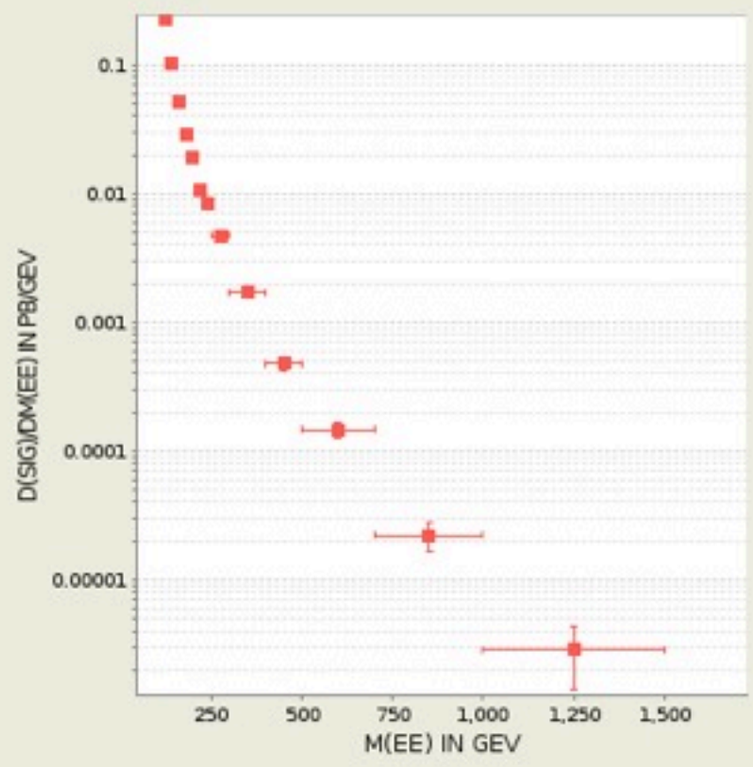
First Author: AAD13
Published as: Not Published
Preprinted as: ARXIV:1305.4192
Experiment Name: CERN-LHC-ATLAS(ATLAS)

Data plot: 1/1
**Measured differential cross sections as a function of the di-electron mass for DY production at the Born and dressed levels**
**'D(SIG)/DM(EE) IN PB/GEV'** versus **'M(EE) IN GEV'**
**'RE : P P –> E+ E- X'**
**'. : BORN'**
**'PT(C=E) IN GEV : > 25'**
**'ABS(ETARAP(EE)) : < 2.5'**
**'SQRT(S) IN GeV : 7000.0'**

Re-plot as: xlin-ylin I xlin-ylog I xlog-ylin I xlog-ylog

Selected Plots: show list I add this plot to list

Go back to: paper I dataset I search box



# Plotting multple datasets within HepData

| | | |
|---|---|---|
| ABS(ETARAP(EE)) | < 2.5 | |
| PT(C=E) | > 25 GeV | |
| RE | P P --> E+ E- X | |
| SQRT(S) | 7000.0 GeV | |
| | BORN | DRESSED |
| M(EE) IN GEV | D(SIG)/DM(EE) IN PB/GEV | |
| 116. – 130. | 0.224 ± 1.1% (stat) ± 4.2% (sys) | 0.215 ± 1.1% (stat) ± 4.2% (sys) |
| 130. – 150. | 0.102 ± 1.4% (stat) ± 4.3% (sys) | 0.0984 ± 1.4% (stat) ± 4.3% (sys) |
| 150. – 170. | 0.0512 ± 2.0% (stat) ± 4.6% (sys) | 0.0493 ± 2.0% (stat) ± 4.6% (sys) |
| | | 5.9% (sys) 0.00165 ± 5.1% (stat) ± 5.9% (sys) |
| | | ± 6.3% (sys) 0.000458 ± 9.4% (stat) ± 6.3% (sys) |
| | | ) ± 5.7% (sys) 0.000141 ± 11.0% (stat) ± 5.7% (sys) |
| | | t) ± 7.5% (sys) 0.0000213 ± 24.0% (stat) ± 7.5% (sys) |
| 1000. – 1500. | 0.00000288 ± 50.0% (stat) ± 9.8% (sys) | 0.00000276 ± 50.0% (stat) ± 9.8% (sys) |
| | Plot SelectPlot | Plot SelectPlot |

ermalinks: I by Inspire ID
Reaction db ID=8470, RED=6090
ast updated: 20131218145753)

## Reaction Database Selected Datasets for Composite Plot

Multiple datasets from the same, or different, HepData records can be combined on a single plot. This page presents and allows manipulation of these datasets which have been selected from previous pages either:

a) from the 'plot' pages using '**add this plot to list**' link
b) from the 'paper' pages using the '**SelectPlot**' link

Options are provided here to manipulate the list by deleting an item (x), clearing the complete list, or returning to the 'paper' pages to add more data sets. More details of individual data sets can be displayed by using the 'summary (?)' link. Options to modify the look of the plot are provided on the next page.

| Current list of selected plots | | | | | | | | remove | summary |
|---|---|---|---|---|---|---|---|---|---|
| 1 | AAD 13 | 1 | 1 | ATLAS | D(SIG)/DM(EE) IN PB/GEV | w.r.t | M(EE) IN GEV | x | ? |
| 2 | AAD 13 | 1 | 2 | ATLAS | D(SIG)/DM(EE) IN PB/GEV | w.r.t | M(EE) IN GEV | x | ? |

Make the Plot

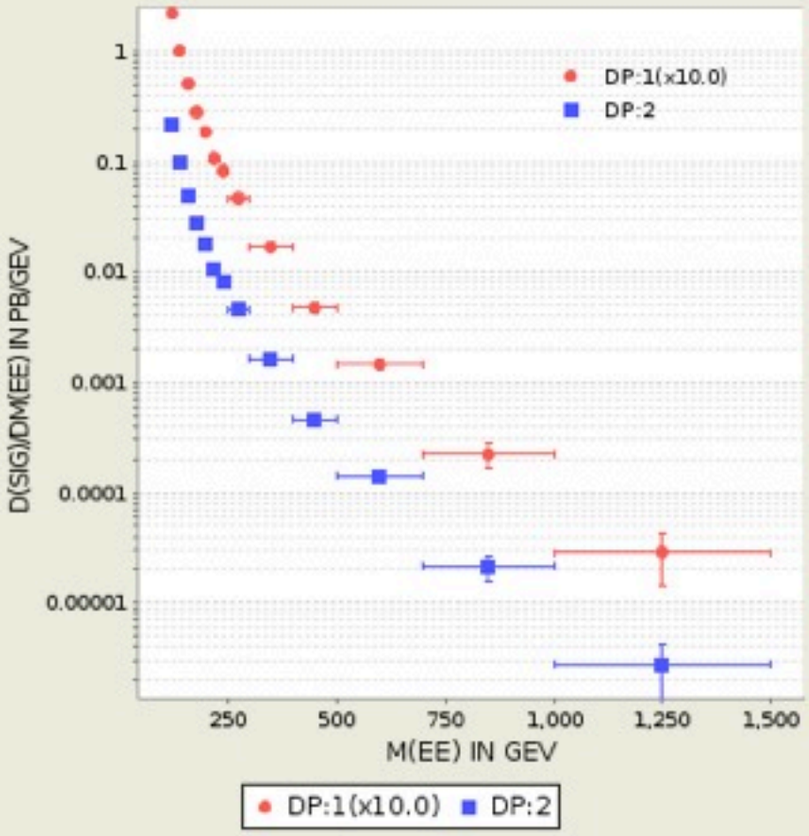
undo last remove I clear list I Go back to paper I Go back to search result

Contact us at: hepdata@projects.hepforge.org

# Plotting multiple datasets within HepData

## Reaction Database Composite Plot

This page displays the combined data plot with options to 'replot' the data changing various features of the plot.
Mouseover keywords for more information.




Re-Submit the Plot | Go to Simpler Plot

Xscale lin | Yscale log | Syst... yes

Xmin | Xmax | Ymin | Ymax

Xsize 400 | Ysize 400 | png/pdf | filename

Xkey | Ykey | Xtext | Ytext

Reset Above to Default Settings | Reset X range | Reset Y range

X-label

Y-label

Text

Options(DP:1): scale=10 what's this?

Options(2):

Reset All to Default Settings

**Back to the list of selected plots**

| | DP:1+2 | DP:1 | DP:2 |
|---|---|---|---|
| AAD 2013 | | | |
| CERN-LHC-ATLAS | | | |
| CERN-PH-EP-2013-064 | | | |
| T 2,F 2,3 | | | |
| | | BORN | DRESSED |
| ABS(ETARAP(EE)) : < 2.5 | | | |
| P P --> E+ E- X | | | |
| PT(C=E) IN GEV : > 25 | | | |
| SQRT(S) : 7000.0 GeV | | | |
| D(SIG)/DM(EE) IN PB/GEV<-->M(EE) IN GEV | | | |

# BICEP2 record in HepData

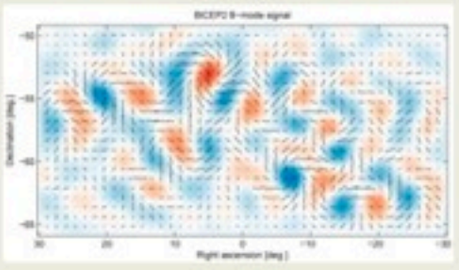
## Reaction Database Full Record Display

View short record or as: input, plain text, AIDA, PyROOT, YODA, ROOT, mpl, ScaVis or MarcXML

## ADE 2014 — BICEP2 I: Detection Of B-mode Polarization at Degree Angular Scales

Experiment: **BICEP2 (BICEP2)**
Archived as: **ARXIV:1403.3985**
Auxiliary Material: http://bicepkeck.org/bicep2_2014_release/
Record in: **INSPIRE**
Record in: **CERN Document Server**

BICEP2. Results are reported from the BICEP2 experiment, a Cosmic Microwave Background (CMB) polarimeter specifically designed to search for the signal of inflationary gravitational waves in the B-mode power spectrum around angular multipole ~ 80. BICEP2 observed from the South Pole for three seasons from 2010 to 2012. An excess of B-mode power over the base lensed-LambdaCDM expectation is found in the range 30 < multipole < 150, inconsistent with the null hypothesis at a significance of > 5 sigma. The observed B-mode power spectrum is well-fit by a lensed-LambdaCDM + tensor theoretical model with tensor/scalar ratio r = 0.20 +0.07,-0.05, with r = 0 disfavoured at 7.0 sigma. Subtracting the best available estimate for foreground dust modifies the likelihood slightly so that r = 0 is disfavoured at 5.9 sigma.



The links immediately below give access to the original files provided by the BICEP2 experiment (see Auxiliary Material). The information in the first two links is also given further below in Table 1 (corresponding to Figure 2 of the paper) and Table 2 (corresponding to the middle panel of Figure 10 of the paper).

| | |
|---|---|
| Tabulated likelihood for the tensor-to-scalar ratio, r, computed using the "direct likelihood" calculation | rlikelihood.txt |
| Bandpowers and statistical uncertainties | bandpowers.txt |
| Bandpower window functions for each multipole bin | allbins.tgz I bin1.txt I bin2.txt I bin3.txt I bin4.txt I bin5.txt I bin6.txt I bin7.txt I bin8.txt I bin9.txt |

# How does data get into HepData ?

- Regular literature scans (arXiv) for new suitable data.
- Experimenters send us text files of numbers either at our request or unsolicited.
- We can also extract the numbers from the latex files on arXiv if the data is in tabular form in the paper.
- We process them into a HepData record.
- Finally we invite the authors to approve the record.

# The Durham HepData Project



## Submitting Data to the Reaction Database

The compilers of the Reaction Database regularly scan the archives and literature to locate suitable new data sets for inclusion in the database, often contacting the experiments directly to obtain the exact numerical data.

If you have, or know of, data which you think should be in the database, then please email us about this.

The criteria for data to be included is that it be data of a publishable form and not preliminary data. Data from conferences often fall into the latter category. If it is possible that data will change following peer review, it may be better to delay HepData submission until after journal acceptance.

The format we accept data in is very wide and generally we require only a flat file containing the numerical values. Postscript and pdf figures are not suitable.

Ideally the format should be:

**xlow xhigh y +stat -stat +sys1 -sys1 +sys2 -sys2** ...

where:
**xlow** and **xhigh** are the xbin edges
**y** is the measured quantity
**+stat** and **-stat** are the positive and negative statistical errors (could also be **+-stat** if equal)
**+sysn** and **-sysn** are any number of positive and negative systematic errors (again could be **+-sysn** if equal)

You can also include other things like **xfocus** (mean of the distribution within the bin); just specify the column definitions when submitting the data.

Any text files you send us will be processed into a standard format, which can be seen from the "input" link on any of the existing records. Data submissions provided in text formats closer to the "input" format can therefore be entered more quickly into the database. You can start by looking at the "input" file for an existing record that is similar to your submitted data. An annotated sample input file is available, as is the historical 1970s encoding manual (14 MB) defining some nomenclature that is still used in practice. It is useful to provide key metadata for each table such as a caption, the process being considered (initial-state and final-state particles), important kinematic cuts, and headers for the x and y columns specifying the quantity with units. Multiple x and y values can be given in the same row separated by semicolons and non-existent entries can be indicated by dashes "-". Numerical values should be given with an appropriate and not excessive number of significant figures (in general, a maximum of 4), avoiding giving more decimal places for the errors than the central values. An online form is available to test data input. Click on "Browse..." to select your input file, followed by "Upload" and "Process", then click "Display" for the first 10 tables, or "All" for the whole record. Please note that this online form is only for testing purposes, and the final submittal to HepData must still be done by email.

Contact us at: **hepdata@projects.hepforge.org**

HepData is funded by the UK STFC and hosted at the Durham IPPP.
HepData also maintains the UK mirror of the PDG.

# How should data get into HepData ?

Given the volume of data already from the LHC, and the expected increase from Run 2, we feel there needs to be an increase of input into HepData 'directly' from the experiments.

We have an input web form, recently linked from the main page, which can already be used by anyone to test data input.

Main problem for outsiders is to know the 'meta-data' formats and the 'input number' formats.

Very recently this has been used by PHENIX to upload data to HepData - and we appreciate their comments on how this can be improved.

We intend to develop a more 'bare-bones' and 'flexible' approach in which the user directly uploads, to the DB, tables of data, or even Root files, needing only to put a minimum of extra information, mainly bibliographic and textual comments.

# DATA INPUT FORM

Please specifiy a file to upload

1 Browse... No file selected.

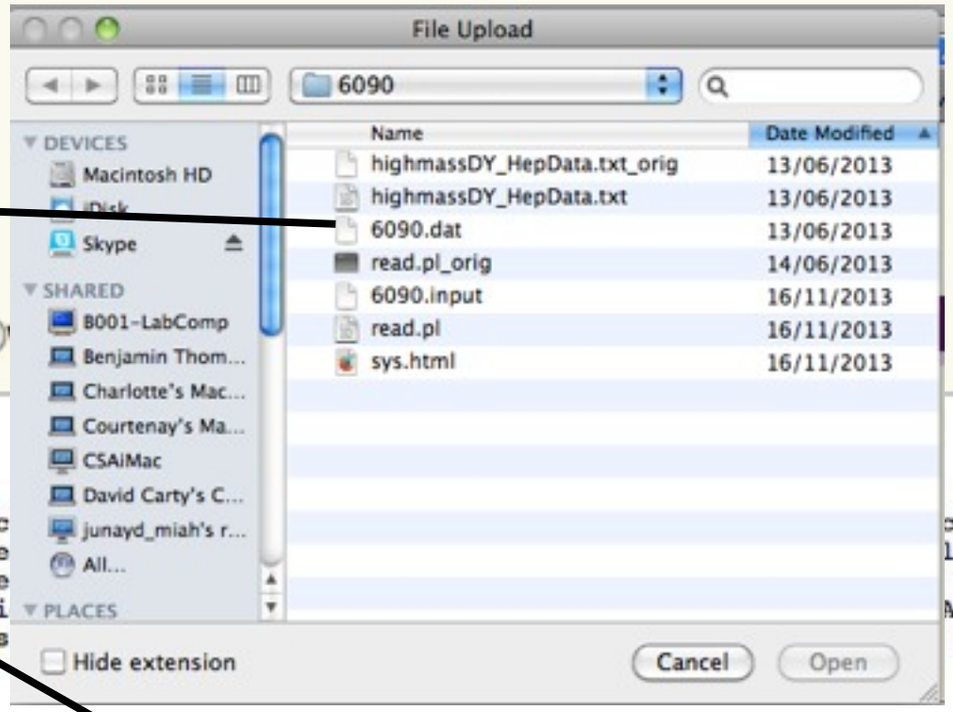
2 Upload

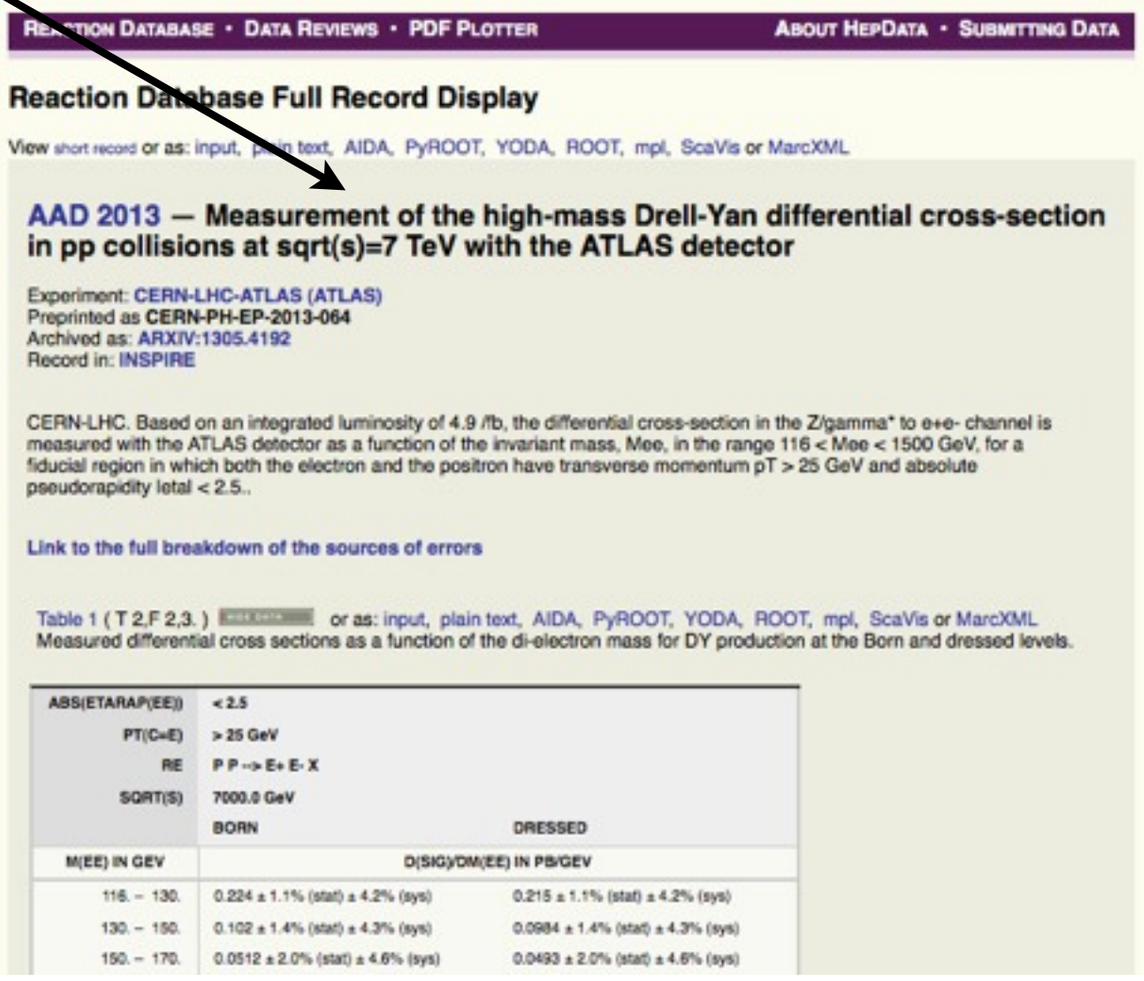
Uploading the file 6090.input

3 Process the Input Data - then -[Display][All] the Final Record ( getstarted

4

```
*author: AAD
*reference: CERN-PH-EP-2013-064 : 2013
*reference: ARXIV:1305.4192 : 2013
*status:  Encoded 31 MAY 2013 by MRW
*title: Measurement of the high-mass Drell-Yan differential cross-sec                ctor
*comment: CERN-LHC. Based on an integrated luminosity of 4.9 /fb, the               l is measured with the
ATLAS detector as a function of the invariant mass, Mee, in the range                the electron and the
positron have transverse momentum pT > 25 GeV and absolute pseudorapi               AS Luminosity
measurement (Eur.Phys.J. C73 (2013) 2518) the measured cross-sections               The luminosity
uncertainty stays at the previous value of 1.8%
*durhamId: 6090
*inspireId: 1234228
*detector:  ATLAS
*experiment: CERN-LHC-ATLAS
*dataset:
*location: T 2,F 2,3
*dscomment: Measured differential cross sections as a function of the di-electr
 DY production at the Born and dressed levels
*reackey: P P --> E+ E- X
*obskey: DSIG/DM
```



REACTION DATABASE • DATA REVIEWS • PDF PLOTTER ABOUT HEPDATA • SUBMITTING DATA

**Reaction Database Full Record Display**

View short record or as: input, plain text, AIDA, PyROOT, YODA, ROOT, mpl, ScaVis or MarcXML

**AAD 2013 — Measurement of the high-mass Drell-Yan differential cross-section in pp collisions at sqrt(s)=7 TeV with the ATLAS detector**

Experiment: CERN-LHC-ATLAS (ATLAS)
Preprinted as CERN-PH-EP-2013-064
Archived as: ARXIV:1305.4192
Record in: INSPIRE

CERN-LHC. Based on an integrated luminosity of 4.9 /fb, the differential cross-section in the Z/gamma* to e+e- channel is measured with the ATLAS detector as a function of the invariant mass, Mee, in the range 116 < Mee < 1500 GeV, for a fiducial region in which both the electron and the positron have transverse momentum pT > 25 GeV and absolute pseudorapidity letal < 2.5..

Link to the full breakdown of the sources of errors

Table 1 ( T 2,F 2,3. ) or as: input, plain text, AIDA, PyROOT, YODA, ROOT, mpl, ScaVis or MarcXML
Measured differential cross sections as a function of the di-electron mass for DY production at the Born and dressed levels.

| ABS(ETARAP(EE)) | < 2.5 | |
|---|---|---|
| PT(C=E) | > 25 GeV | |
| RE | P P --> E+ E- X | |
| SQRT(S) | 7000.0 GeV | |
| | BORN | DRESSED |
| M(EE) IN GEV | D(SIG)/DM(EE) IN PB/GEV | |
| 116. – 130. | 0.224 ± 1.1% (stat) ± 4.2% (sys) | 0.215 ± 1.1% (stat) ± 4.2% (sys) |
| 130. – 150. | 0.102 ± 1.4% (stat) ± 4.3% (sys) | 0.0984 ± 1.4% (stat) ± 4.3% (sys) |
| 150. – 170. | 0.0512 ± 2.0% (stat) ± 4.6% (sys) | 0.0493 ± 2.0% (stat) ± 4.6% (sys) |

1 - browse for the prepared input file

2 - upload the file

3 - process the file

4 - display the HepData record

# HepData-Inspire connection

- HepData is linked to Inspire at various levels

1. Reciprocal links on their respective web pages for common papers.

2. Inspire holds a copy of the HepData data records and displays via the HepData tag on their "detailed record" page.

3. HepData has the facility to use Inspire searching, for example a word from the title with "title:Higgs".

HepData

1. **ABELEV 2013** – Experiment: **CERN-LHC-ALICE** (ALICE)
Preprint: **CERN-PH-EP-2013-135** Archive: **ARXIV:1307.6796**

***Multiplicity Dependence of Pion, Kaon, Proton and Lambda Production in p–Pb Collisions at sqrt(s_NN) = 5.02 TeV***

Full data record | Short data record | **INSPIRE**

Inspire

**HEP** 1 records found Search took 0.05 seconds.

1. **Multiplicity Dependence of Pion, Kaon, Proton and Lambda Production in p-Pb Collisions at $\sqrt{(s_N N)}$ = 5.02 TeV**
ALICE Collaboration (Betty Bezverkhny Abelev (LLNL, Livermore) *et al.*). Jul 25, 2013. 14 pp.
Published in **Phys.Lett. B728 (2014) 25-38**
CERN-PH-EP-2013-135
DOI: 10.1016/j.physletb.2013.11.020
e-Print: **arXiv:1307.6796** [nucl-ex] | **PDF**
References | BibTeX | LaTeX(US) | LaTeX(EU) | Harvmac | EndNote
ADS Abstract Service; Link to Article from SCOAP3
Data: INSPIRE | HepData
Detailed record - Cited by 19 records

Inspire - 'Detailed Record'

Welcome to INSPIRE, the High Energy Physics information system. Please direct questions, comments or concerns to feedback@inspirehep.net.

HEP :: HEPNAMES :: INSTITUTIONS :: CONFERENCES :: JOBS :: EXPERIMENTS :: JOURNALS :: HELP

Information | References (68) | Citations (19) | Files | Plots | HepData

**Multiplicity Dependence of Pion, Kaon, Proton and Lambda Production in p-Pb Collisions at $\sqrt{(s_N N)}$ = 5.02 TeV**

ALICE Collaboration (Betty Bezverkhny Abelev (LLNL, Livermore) *et al.*) *Show all 942 authors*

Jul 25, 2013 - 14 pages

Information | References | Citations | Files | Plots | HepData

**Multiplicity Dependence of Pion, Kaon, Proton and Lambda Production in p-Pb Collisions at $\sqrt{(s_N N)}$ = 5.02 TeV**
- ALICE Collaboration (Abelev, Betty Bezverkhny *et al.*) Phys.Lett. B728 (2014) 25-38 arXiv:1307.6796 [nucl-ex] CERN-PH-EP-2013-135

THIS DATA COMES FROM DURHAM HEPDATA PROJECT

SUMMARY:

CERN-LHC. Measurements of the transverse momentum multiplicity dependences of
Proton-Lead collisions at a centre-of-mass energy/nucleon of 5.02 TeV. The dependen
momentum on the charged particle multiplicity density dN/dETARAP is also presented

Inspire

DATASETS:

**Description:** pT-differential invariant yield of charged pions in pPb collisions with centr

Go to the record

Plain

| | $p\,Pb \to (PI^+ + PI^-)\,X$ | | |
|---|---|---|---|
| | $y_{CM} = 0.0 - 0.5$ | | |
| $class = 0.0 - 5.0\,\%$ | $= 5.0 - 10.0\,\%$ | $= 10.0 - 2$ | |
| | $\sqrt{s}/nucleon = 5020.0\,GeV$ | | |
| $p_T\,(GeV)$ | $(1/Nev) \cdot (1/(2 \cdot PI \cdot p_T)) \cdot d^2(N)/dp_T/d$ | | |

↑↑↑Collapse↑↑↑

| | | | |
|---|---|---|---|
| 0.1–0.12 | 93.88 ±0.23(stat) ±6.75(sys) | 78.00 ±0.21(stat) ±5.61(sys) | 67.39 ±0. ±4.85( |
| 0.12–0.14 | 82.47 ±0.17(stat) ±3.73(sys) | 68.38 ±0.15(stat) ±3.09(sys) | 59.00 ±0. ±2.67( |

Inspire uploads data on a regular basis from HepData based on a HepData 'timestamp' indicating the date of last change.

As yet does not upload any of the 'resource area' extra files.

Inspire attempts reformatting items of the text (eg reactions).

# Reaction Database Full Record Display

View short record or as: input, plain text, AIDA, PyROOT, YODA, ROOT, mpl, ScaVis or MarcXML

## ABELEV 2013 — Multiplicity Dependence of Pion, Kaon, Proton in p--Pb Collisions at sqrt(s_NN) = 5.02 TeV

Experiment: CERN-LHC-ALICE (ALICE)
Preprinted as CERN-PH-EP-2013-135
Archived as: ARXIV:1307.6796
Record in: INSPIRE

HepData

CERN-LHC. Measurements of the transverse momentum multiplicity dependences of Pion, Kaon, Proto
production in Proton-Lead collisions at a centre-of-mass energy/nucleon of 5.02 TeV. The dependences
mean transverse momentum on the charged particle multiplicity density dN/dETARAP is also presented

Total number of tables: **22**. Displaying: **1** to **10**. First | Previous | Next | Last | All

Table 1 ( F 1. ) HIDE DATA or as: input, plain text, AIDA, PyROOT, YODA, ROOT, mpl, ScaVis
pT-differential invariant yield of charged pions in pPb collisions with centre-of-mass energy/nucleon=5.0

| RE | P PB --> (Pl+ + Pl-) X | | |
|---|---|---|---|
| SQRT(S)/NUCLEON | 5020.0 GeV | | |
| YRAP(C=CM) | 0.0-0.5 | | |
| class | 0.0-5.0 pct | 5.0-10.0 pct | 10.0-20.0 pct |
| PT IN GEV | (1/Nev)*(1/(2*Pl*PT))*D2(N)/DPT/DYRAP IN GEV | | |
| 0.1 – 0.12 | 93.88 ± 0.23 (stat) ± 6.75 (sys) | 78.00 ± 0.21 (stat) ± 5.61 (sys) | 67.39 ± 0.14 (stat) ± 4. |
| 0.12 – 0.14 | 82.47 ± 0.17 (stat) ± 3.73 (sys) | 68.38 ± 0.15 (stat) ± 3.09 (sys) | 59.00 ± 0.10 (stat) ± 2. |
| 0.14 – 0.16 | 72.69 ± 0.15 (stat) ± 3.29 (sys) | 60.08 ± 0.13 (stat) ± 2.72 (sys) | 51.80 ± 0.09 (stat) ± 2. |

# HepData-Elsevier connection

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Durham University

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ELSEVIER

Physics Letters B

Volume 728, 20 January 2014, Pages 562–578

## Search for new phenomena in photon + jet events collected in proton–proton collisions at $\sqrt{s} = 8$ TeV with the ATLAS detector ☆

ATLAS Collaboration •

Show more

http://dx.doi.org/10.1016/j.physletb.2013.12.029

Open Access


### Abstract

This Letter describes a model-independent search for the production of new resonances in photon + jet ($\gamma$+jet) events using 20 fb$^{-1}$ of proton–proton LHC data recorded with the ATLAS detector at a centre-of-mass energy of $\sqrt{s} = 8$ TeV. The $\gamma$+jet mass distribution is compared to a background model fit from data; no significant deviation from the background-only hypothesis is found. Limits are set at 95% credibility level on generic Gaussian-shaped signals and two benchmark phenomena beyond the Standard Model: non-thermal quantum black holes and excited quarks. Non-thermal quantum black holes are excluded below masses of 4.6 TeV and excited quarks are excluded below masses of 3.5 TeV.


### 1. Introduction

Several exotic production mechanisms have been proposed that produce massive photon + jet ($\gamma$+jet) final states. They include non-thermal quantum black holes (QBHs) [1], [2] and [3], excited quarks [4], [5] and [6], quirks [7], [8] and [9], Regge excitations of string theory [10], [11] and [12], and topological pions [13]. Of the past searches [14], [15], [16], [17] and [18], the only LHC search for this signature was done using proton–proton ($pp$) collision data obtained at a centre-of-mass energy of $\sqrt{s} = 7$ TeV with the ATLAS detector. It

Recommended articles

Citing articles (0)

Related reference work articles

Data for this Article

HepData
Reaction data

## The Durham HepData Project

Reaction Database • Data Reviews • PDF Plotter | About HepData • Submitting

### Reaction Database Full Record Display

View short record or as: input, plain text, AIDA, PyROOT, YODA, ROOT, mpl, ScaVis or MarcXML

### AAD 2013 — Search for new phenomena in photon+jet events collected in proto proton collisions at sqrt(s) = 8 TeV with the ATLAS detector

Experiment: CERN-LHC-ATLAS (ATLAS)
Published in PL B728,562 (2014) (DOI:10.1016/j.physletb.2013.12.029)
Preprinted as CERN-PH-EP-2013-126
Archived as: ARXIV:1309.3230
Auxiliary Material: http://atlas.web.cern.ch/Atlas/GROUPS/PHYSICS/PAPERS/EXOT-2012-22/
Record in: INSPIRE
Record in: CERN Document Server

CERN-LHC. A model-independent search is made for the production of new resonances in photon + jet events using 20 fb^-1 of proton-proton LHC data recorded with the ATLAS detector in 2012 at a centre-of-mass energy of sqrt(s) = 8 TeV. The photon + jet mass distribution is compared to a background model fit from data; no significant deviation from the background-only hypothesis is found. Limits are set at 95% credibility level on generic Gaussian-shaped signals and two benchmark phenomena beyond the Standard Model: non-thermal quantum black holes and excited quarks. Non-thermal quantum black holes are excluded below masses of 4.6 TeV and excited quarks are excluded below masses of 3.5 TeV.

Table 1 ( Figure 1. ) [redacted] or as: input, plain text, AIDA, PyROOT, YODA, ROOT, mpl, ScaVis or MarcXML
Invariant mass of the photon+jet pair for events passing the final selections. The number of observed events and the fit background estimates are given in each bin, where the fit estimates are rounded to the nearest integer.

| RE | P P –> GAMMA JET X | |
|---|---|---|
| SQRT(S) | 8000.0 GeV | |
| | Observed Data | Fit Estimate |
| M(GAMMA JET) IN GEV | Events | |

# Data - what is a dataset?
# the view from HepData

- Generally data is published in a paper as a result of a specific analysis based on an input dataset.
- Each paper could contain one or several datasets.
- Datasets in papers could be single tables or several tables (or plots).
- Datasets could be spread over several papers.
- Datasets could extend beyond papers (ie extra data)

---

- HepData codes a single paper as one record.
- HepData's table structure is not necessarily the same as that in the paper.

# Datasets - how to assign DOIs
# A few thoughts from HepData

- Given the description of datasets on the previous slide it is not obvious at what level DOI's should be assigned in HepData records
- A single DOI per record?
- A single DOI per table?
- Possibly multiple DOIs in a record but not simply following the table structure, more aligned to the real 'data' structure.
- Could DOIs extend over several HepData records?
- Apart from assigning DOIs, other things to consider are: versioning, removal of tables/records

# Some statistics

- Total Records/Papers: 7893
- LHC  261 / 662
  - ATLAS 122 / 263
  - CMS  59 / 270
  - ALICE 61 / 76
  - LHCb 15/44

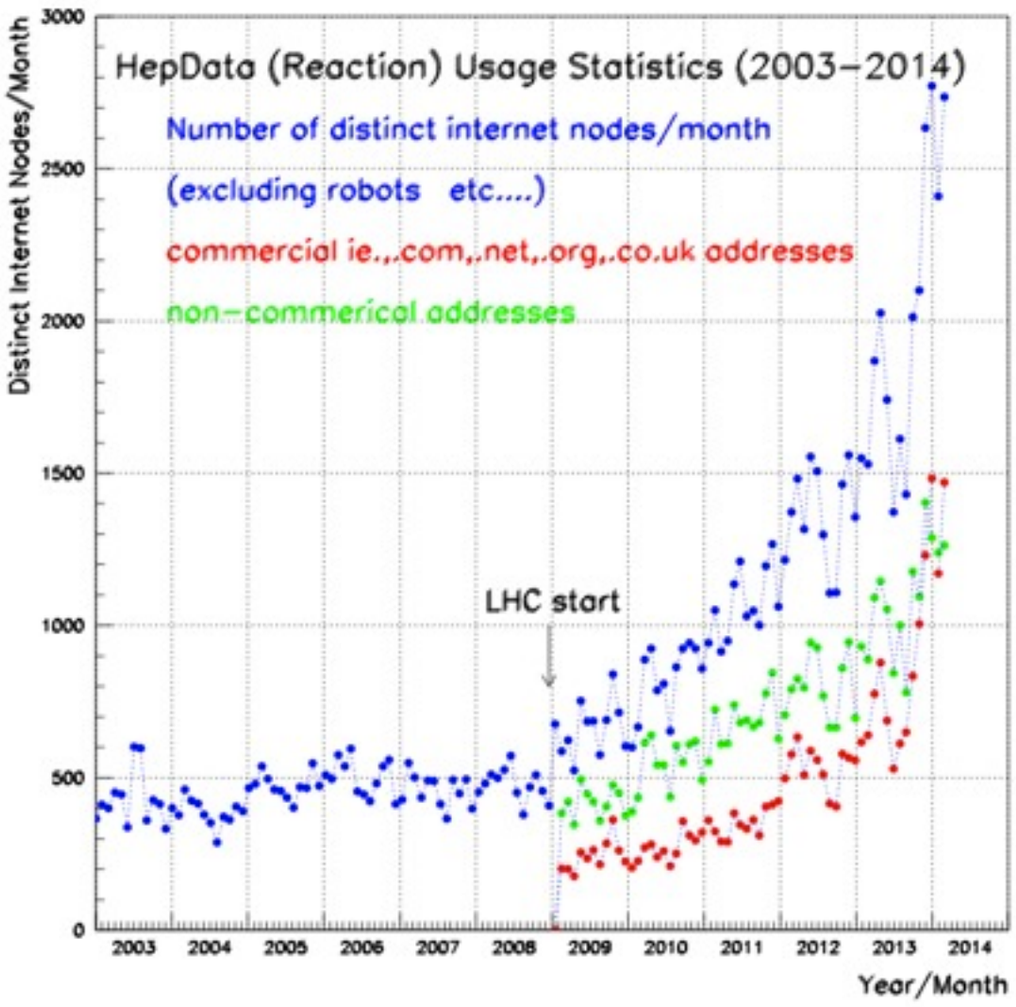
Although apparently only ~30% of LHC data has been entered into HepData this represents a very large part of the 'classic' HepData type data (ie SM type).  Searches and more exotic things are less well represented.

# HepData Usage

As a metric to measure the use of HepData we have continued to count the number of distinct internet nodes, excluding robots etc., accessing per month.

This remained steady from ~500 up to 2009, the start of the LHC, then has increased five-fold to the present day.

We show in RED the accesses from 'commercial' sites (ie those ending .com, .net, .org and .co.uk) and in GREEN the rest.



# Summary & Conclusions

Status

- HepData has continued to add new records, mainly LHC data.
- New DBM, Graeme Watt, in place to replace MW on retirement
- Improvements to web pages, plotting, user documentation are on-going
- We see an apparent continued growth in usage

Future (for discussion)

- Need to engage experiments more in adding data directly themselves.
- Need to incorporate more data 'types' (eg 3D histograms, corr. matrices) into the Database model.
- Need to resolve the problem of assigning DOIs to data.
- Need to upgrade the Inspire-HepData connection.