



Science and
Technology
Facilities Council



HEPData
(hepdata.net)

Love Data Week 2025
Ghent University

Graeme Watt – Project Manager/Lead

Jordan Byers – Research Software Engineer (**Me**)

What is HEPData?

- **HEPdata** (High Energy Physics) is an online open-access repository for tabular high-level data, containing more than 10K HEP publications (130K data tables)
- Funded by the **UK STFC** (Science & Technology Facilities Council), based in the **IPPP** (Institute for Particle Physics Phenomenology) at **Durham University**
- We apply the **FAIR** principles (Findable, Accessible, Interoperable, Reusable)
- Infrastructure provided by **CERN IT**, with support from **CERN SIS**

Website: <https://hepdata.net>

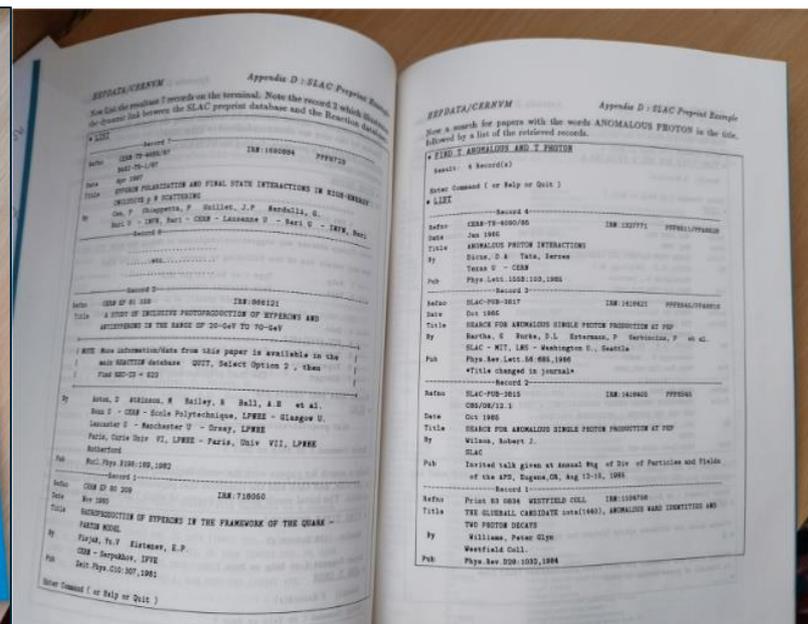
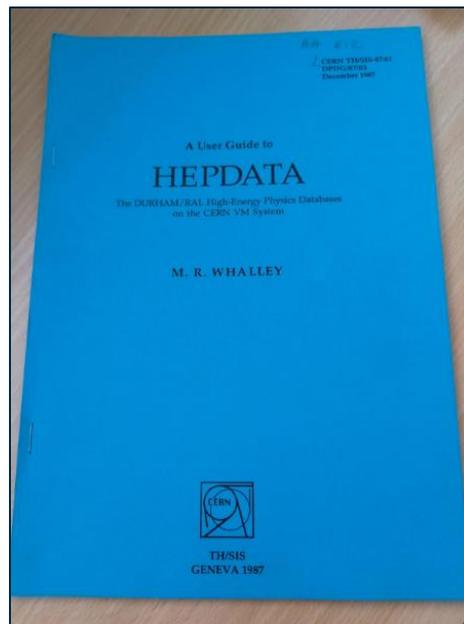
Docs: <https://hepdata.readthedocs.io/en/latest/>

GitHub: <https://github.com/HEPData/>

HEPData - A Brief History

- Started life in the 70s
- Web interface introduced in the early 90s
- Hosted at `hepdata.cedar.ac.uk`, until a 2017 redevelopment
- `Hepdata.net` launching in 2017 in its current iteration

A copy of the user guide from 1987!



HEPData - Homepage

Currently at nearly 10.5k publications

Search on 10472 publications and 127807 data tables.



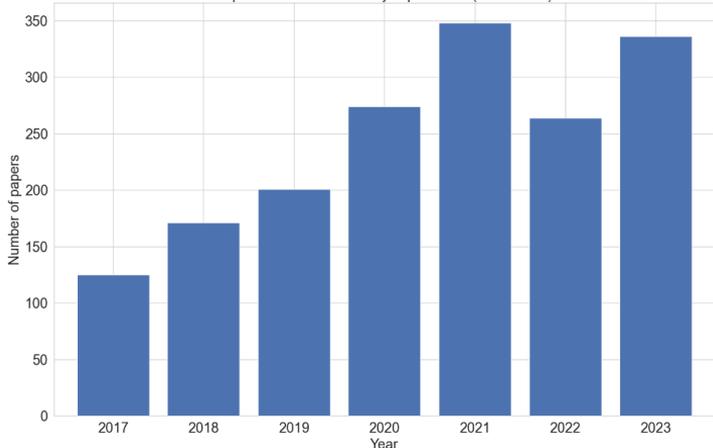
Search for a paper, author, experiment, reaction

Search

Advanced

Submissions per year 2017-2023

hepdata.net submissions by experiments (2024-06-12)



Repository for publication-related High-Energy Physics data

Search on 10472 publications and 127807 data tables.



Search for a paper, author, experiment, reaction

Search

Advanced

e.g. reaction P P → LQ LQ, title has "photon collisions", collaboration is LHCF or D0.

Data from the LHC



ATLAS

[View Data](#)



ALICE

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CMS

[View Data](#)



LHCb

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Recently Updated Submissions - [View all](#)

Search for a heavy pseudoscalar Higgs boson decaying to a 125 GeV Higgs boson and a Z boson in final states with two tau and two light leptons in proton-proton collisions at $\sqrt{s} = 13$ TeV

The [CMS](#) collaboration

[CMS-HIG-22-004](#)

[Updated 2025-01-28](#)

[Published on 2025-01-21](#)

Measurements of Higgs boson production cross section in the four-lepton final state in proton-proton collisions at $\sqrt{s} = 13.6$ TeV

The [CMS](#) collaboration

[CMS-HIG-24-013](#)

[Updated 2025-01-28](#)

[Published on 2025-01-24](#)

Shining Light on the Dark Sector: Search for Axion-like Particles and Other New Physics in Photonic Final States with FASER

The [FASER](#) collaboration

[CERN-EP-2024-262](#)

[Updated 2025-01-23](#)

[Published on 2024-10-14](#)

HEPData - Data

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Browse all
Chekhovsky, Vladimir et al.
19 Citations
1508 Views

Search for a heavy CP-odd Higgs boson, A , decaying into a 125 GeV Higgs boson and a Z boson in final states with two tau and two light leptons in proton-proton collisions at $\sqrt{s} = 13$ TeV

The CMS collaboration

Chekhovsky, Vladimir , Hayrapetyan, Aram , Makarenko, Vladimir , Tumanyan, Armen , Adam, Wolfgang , Andrejic, Janik Walter , Benato, Lisa , Bergauer, Thomas , Chatterjee, Suman , Damjanek, Konstantin

CMS-HIG-22-004, 2023.
<https://doi.org/10.17182/hepdata.155628>

INSPIRE Resources

Abstract (data abstract)
 A search for a heavy CP-odd Higgs boson, A , decaying into a 125 GeV Higgs boson h and a Z boson is presented. The h boson is identified via its decay into a pair of tau leptons, while the Z boson is identified via its decay to a pair of electrons or muons. The search targets production of the A boson via the gluon-gluon fusion process, $gg \rightarrow A$, and also in association with bottom quarks, $b\bar{b}A$. The analysis uses a data sample collected at the CERN LHC with the CMS detector at a proton-proton centre-of-mass energy of $\sqrt{s} = 13$ TeV, corresponding to an integrated luminosity of 138 fb^{-1} . Constraints are set on the product of the branching fraction for the $A \rightarrow Zh$ decay and the cross sections of the A production mechanisms. The observed (expected) upper limit at 95% confidence level ranges from 0.049 (0.060) pb to 1.02 (0.79) pb for the $gg \rightarrow A$ process and from 0.053 (0.059) pb to 0.79 (0.41) pb for the $b\bar{b}A$ process in the probed range of the A boson mass, m_A , from 225 GeV to 1 TeV. The results of the search are used to constrain parameters within the M_{SUSY}^2 benchmark scenario of the minimal supersymmetric extension of the standard model. Values of $\tan\beta$ below 2.2 are excluded in this scenario at 95% confidence level for all m_A values in the range from 225 to 350 GeV.

Figure 4a [10.17182/hepdata.155628.v1.13](#)

License: [CC0](#)

Data from Figure 4a

Exclusion limits on ggA production.

Figure 4b

Data from Figure 4b

10.17182/hepdata.155628.v1.12

Exclusion limits on ggA production.

Fig5-a.txt_95% expected

Example location

10.17182/hepdata.155628.v1.11

Example description

Fig5-a.txt_68% expected

Example location

10.17182/hepdata.155628.v1.14

Example description

Fig5-a.txt_95% observed

Example location

10.17182/hepdata.155628.v1.15

Example description

Fig5-a.txt_68% observed

Example location

10.17182/hepdata.155628.v1.16

Example description

Fig5-a.txt_Best fit

Example location

10.17182/hepdata.155628.v1.17

Example description

Fig5-b.txt_95% expected

Example location

10.17182/hepdata.155628.v1.18

Example description

Fig5-b.txt_68% expected

Example location

10.17182/hepdata.155628.v1.19

Example description

Fig5-b.txt_95% observed

Example location

10.17182/hepdata.155628.v1.20

Example description

cmenergies 13000

observables CLS

reactions P P → A, Zh HIGGS → LEPTON+LEPTON, TAU+ TAU

Limit

Limit	Observed	Expected
SQRT(S)	13 TeV	
LUMINOSITY	138 fb ⁻¹	
A mass [GeV]	Lower 95% CL limit on tan(beta) in the MHEFT125 MSSM scenario.	
225.0	0.343	0.785 ^{+0.010} _{-0.010} ^{+0.46} _{-0.32} ^{+0.44} _{-0.32}
250.0	1.015	0.741 ^{+0.009} _{-0.009} ^{+0.46} _{-0.32} ^{+0.44} _{-0.32}
275.0	0.781	0.646 ^{+0.009} _{-0.009} ^{+0.46} _{-0.32} ^{+0.44} _{-0.32}
300.0	0.417	0.581 ^{+0.009} _{-0.009} ^{+0.46} _{-0.32} ^{+0.44} _{-0.32}
325.0	0.416	0.453 ^{+0.009} _{-0.009} ^{+0.46} _{-0.32} ^{+0.44} _{-0.32}
350.0	0.464	0.356 ^{+0.010} _{-0.010} ^{+0.46} _{-0.32} ^{+0.44} _{-0.32}
375.0	0.333	0.311 ^{+0.009} _{-0.009} ^{+0.46} _{-0.32} ^{+0.44} _{-0.32}
400.0	0.375	0.278 ^{+0.009} _{-0.009} ^{+0.46} _{-0.32} ^{+0.44} _{-0.32}
450.0	0.338	0.209 ^{+0.009} _{-0.009} ^{+0.46} _{-0.32} ^{+0.44} _{-0.32}
500.0	0.144	0.177 ^{+0.009} _{-0.009} ^{+0.46} _{-0.32} ^{+0.44} _{-0.32}
600.0	0.091	0.118 ^{+0.009} _{-0.009} ^{+0.46} _{-0.32} ^{+0.44} _{-0.32}
700.0	0.063	0.086 ^{+0.009} _{-0.009} ^{+0.46} _{-0.32} ^{+0.44} _{-0.32}
800.0	0.06	0.075 ^{+0.009} _{-0.009} ^{+0.46} _{-0.32} ^{+0.44} _{-0.32}
900.0	0.052	0.062 ^{+0.009} _{-0.009} ^{+0.46} _{-0.32} ^{+0.44} _{-0.32}
1000.0	0.049	0.06 ^{+0.009} _{-0.009} ^{+0.46} _{-0.32} ^{+0.44} _{-0.32}

Visualize

Sum errors Log Scale (x) Log Scale (y)

Deselect variables or hide different error bars by clicking on them.

Variables

Lower 95% CL limit on tan(beta) in the MHEFT125 MSSM scenario.
 Link Observed

Lower 95% CL limit on tan(beta) in the MHEFT125 MSSM scenario.
 Link Expected

Summed error

HEPData - Data

- Citable (DOIs)
 - Submissions
 - Data tables
- Downloadable
 - Different formats
- Versioned

HEPData | Belle-II | 2021 | Search

hepdata.net/record/ins1860766?version=1&table=Selection%20efficiency

HEPData Search HEPData Search

About Submission Help File Formats Sign In

Browse all Abudín, F. et al. Last updated on 2022-08-29 13:50 Accessed 905 times Cite JSON

Hide Publication Information

Search for $B^+ \rightarrow K^+ \nu \bar{\nu}$ decays using an inclusive tagging method at Belle II

The Belle-II collaboration

Abudín, F., Adachi, I., Adamczyk, K., Ahlburg, P., Aihara, H., Akopov, N., Aloisio, A., Ky, N., Anh, A., Atmacan, H.

Phys. Rev. Lett. 127 (2021) 181802, 2021.

<https://doi.org/10.17182/hepdata.130199>

Journal INSPIRE Resources

Abstract (data abstract)

SuperKEKB Belle II. Measurement of the branching fraction of $B^+ \rightarrow K^+ \nu \bar{\nu}$ at the Belle II experiment at the SuperKEKB. The analysed data sample corresponds to an integrated luminosity of 63 fb^{-1} collected at the $\Upsilon(4S)$ resonance and a sample of 9 fb^{-1} collected at an energy 60 MeV below the resonance between 2019-2021. Since no significant signal was observed, limit of 4.1×10^{-5} was set using CL_s method.

Download All

- YAML with resource files
- YAML
- YODA
- YODA1
- ROOT
- CSV

Postfit yields off-resonance

Figure 1 in <https://journals.aps.org/prl/supplemental/10.17182/hepdata.130199.v1.t5>
Yields in off-resonance data and as predicted by the simultaneous fit to the on- and off-resonance data, corresponding to an...

Expected and observed limit

Figure 2 in <https://journals.aps.org/prl/supplemental/10.17182/hepdata.130199.v1.t4>
 CL_s value as a function of the branching fraction of $B^+ \rightarrow K^+ \nu \bar{\nu}$ for expected and observed signal...

Selection efficiency

Figure 3 in <https://journals.aps.org/prl/supplemental/10.17182/hepdata.130199.v1.t5>
Signal efficiency as a function of the

Selection efficiency [10.17182/hepdata.130199.v1.t5](https://doi.org/10.17182/hepdata.130199.v1.t5)

License: CC0

Resources <https://www.hepdata.net> JSON

Figure 3 in https://journals.aps.org/prl/supplemental/10.1103/PhysRevLett.127.181802/suppl_mat.pdf

Signal efficiency as a function of the dilepton invariant mass squared q^2 for events in the signal region (SR) ($BDT_1 > 0.9$ and $BDT_2 > 0.95$). The error bars indicate the statistical uncertainty.

phases

- FCNC
- $b \rightarrow s | l$ transition
- electroweak penguin decay
- missing energy

reactions

- $B^+ \rightarrow K^+ \nu \bar{\nu}$

Luminosity	$63+9 \text{ fb}^{-1}$
$q^2 [\text{GeV}^2/c^2]$	Efficiency
0.0 - 2.0	12.66745695 10.27207295
2.0 - 4.0	10.82571692 10.26463508
4.0 - 6.0	7.04488885 10.2279663
6.0 - 8.0	3.51769225 10.1711556
8.0 - 10.0	1.46683133 10.11813559
10.0 - 12.0	0.68175914 10.06791158

Visualize

HEPData – Data (Submission)

Submission information:

- Title
- Experiment
- Authors
- Publication
- DOI
- INSPIREHEP Link
- Resource Files
- Abstract

Q Browse all  Chekhovsky, Vladimir et al.

◀ Hide Publication Information

Search for a heavy pseudoscalar Higgs boson decaying to a 125 GeV Higgs boson and a Z boson in final states with two tau and two light leptons in proton-proton collisions at $\sqrt{s} = 13$ TeV

The CMS collaboration

Chekhovsky, Vladimir , Hayrapetyan, Aram , Makarenko, Vladimir , Tumasyan, Armen , Adam, Wolfgang , Andrejkovic, Janik Walter , Benato, Lisa , Bergauer, Thomas , Chatterjee, Suman , Damanakis, Konstantinos

CMS-HIG-22-004, 2025.

<https://doi.org/10.17182/hepdata.155628>

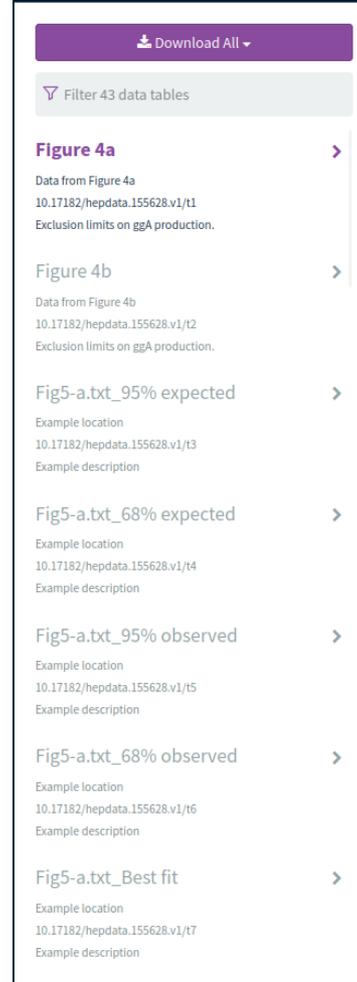
Abstract (data abstract)

A search for a heavy CP -odd Higgs boson, A , decaying into a 125 GeV Higgs boson h and a Z boson is presented. The h boson is identified via its decay into a pair of tau leptons, while the Z boson is identified via its decay to a pair of electrons or muons. The search targets production of the A boson via the gluon-gluon fusion process, $gg \rightarrow A$, and also in association with bottom quarks, $b\bar{b}A$. The analysis uses a data sample collected at the CERN LHC with the CMS detector at a proton-proton centre-of-mass energy of $\sqrt{s} = 13$ TeV, corresponding to an integrated luminosity of 138 fb^{-1} . Constraints are set on the product of the branching fraction for the $A \rightarrow Zh$ decay and the cross sections of the A production mechanisms. The observed (expected) upper limit at 95% confidence level ranges from 0.049 (0.060) pb to 1.02 (0.79) pb for the $gg \rightarrow A$ process and from 0.053 (0.059) pb to 0.79 (0.61) pb for the $b\bar{b}A$ process in the probed range of the A boson mass, m_A , from 225 GeV to 1 TeV. The results of the search are used to constrain parameters within the $M_{h, \text{EFT}}^{125}$ benchmark scenario of the minimal supersymmetric extension of the standard model

HEPData – Data (Data Tables)

A searchable list of the submission figures

- Download link
- Title
- Location
- DOI
- Description



Download All ▾

Filter 43 data tables

Figure 4a >

Data from Figure 4a
10.17182/hepdata.155628.v1/t1
Exclusion limits on ggA production.

Figure 4b >

Data from Figure 4b
10.17182/hepdata.155628.v1/t2
Exclusion limits on ggA production.

Fig5-a.txt_95% expected >

Example location
10.17182/hepdata.155628.v1/t3
Example description

Fig5-a.txt_68% expected >

Example location
10.17182/hepdata.155628.v1/t4
Example description

Fig5-a.txt_95% observed >

Example location
10.17182/hepdata.155628.v1/t5
Example description

Fig5-a.txt_68% observed >

Example location
10.17182/hepdata.155628.v1/t6
Example description

Fig5-a.txt_Best fit >

Example location
10.17182/hepdata.155628.v1/t7
Example description

HEPData – Data (Data Table)

An individual data table:

- Data table information
 - Name, description, license etc.
- DOI
- Resource Links
- Alternate format links
- Visualisations
- Graph Images
- Data Table

Figure 4a [10.17182/hepdata.155628.v1/11](https://www.hepdata.net/record/ins2872775)
 License: [CC0](https://creativecommons.org/licenses/by/4.0/)
 Data from Figure 4a
 Exclusion limits on ggA production.

Resources <https://www.hepdata.net/r> [JSON](#)

cmenergies 13000

observables CLS

reactions P P --> A Z0 HIGGS --> LEPTON+ LEPTON- TAU+ TAU-

Limit	Observed	Expected
SQRT(S)	13 TeV	
LUMINOSITY	138 fb ⁻¹	
A mass [GeV]	Lower 95% CL limit on tan(beta) in the MhEFT125 MSSM scenario.	
225.0	0.943	0.785 ^{+0.251} _{-0.232} 1 s.d. ^{+0.797} _{-0.379} 2 s.d.
250.0	1.015	0.741 ^{+0.324} _{-0.252} 1 s.d. ^{+0.762} _{-0.359} 2 s.d.
275.0	0.781	0.646 ^{+0.293} _{-0.194} 1 s.d. ^{+0.668} _{-0.313} 2 s.d.
300.0	0.417	0.581 ^{+0.261} _{-0.177} 1 s.d. ^{+0.594} _{-0.282} 2 s.d.
325.0	0.416	0.453 ^{+0.211} _{-0.139} 1 s.d. ^{+0.484} _{-0.233} 2 s.d.
350.0	0.464	0.356 ^{+0.172} _{-0.111} 1 s.d. ^{+0.399} _{-0.178} 2 s.d.
375.0	0.333	0.311 ^{+0.151} _{-0.092} 1 s.d. ^{+0.352} _{-0.156} 2 s.d.
400.0	0.375	0.278 ^{+0.135} _{-0.087} 1 s.d. ^{+0.315} _{-0.139} 2 s.d.

Visualize

Sum errors Log Scale (X) Log Scale (Y)

Deselect variables or hide different error bars by clicking on them.

HEPData – Additional Resources

The screenshot shows the HEPData website interface. A modal window titled "Additional Publication Resources" is open, displaying a list of resources. The background page shows a search result for "search for supersymmetry in final states with missing transverse momentum and three or more b -jets in 139 fb⁻¹ of proton–proton collisions at $\sqrt{s} = 13$ TeV with the ATLAS detector". The "Resources" button in the background is circled in red.

Additional Publication Resources

filter

Common Resources 8

- Systematic table for SR_Gtt_0L_B 2
- Systematic table for SR_Gtt_0L_M1 2
- Systematic table for SR_Gtt_0L_M2 2
- Systematic table for SR_Gtt_0L_C 2
- Systematic table for SR_Gtt_1L_B 2
- Systematic table for SR_Gtt_1L_M1 2
- Systematic table for SR_Gtt_1L_M2 2
- Systematic table for SR_Gtt_1L_C 2
- Systematic table for SR_Gbb_B 2

Resource 1:
description: Param card (SLHA file) for Gbb 2000, 1000 model, location: param_card_376017.dat
License: CC0
10.17182/hepdata.95928.v2/r3
Landing Page
Download

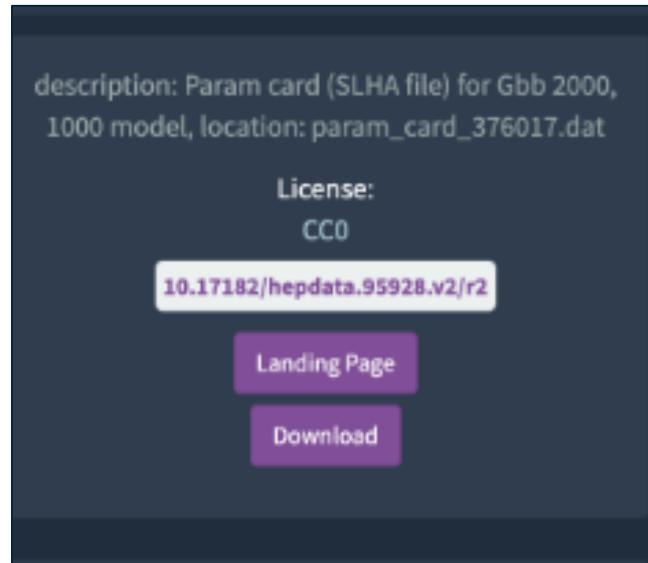
Resource 2:
description: Param card (SLHA file) for Gtb 2200, 600 model, location: param_card_376093.dat
License: CC0
10.17182/hepdata.95928.v2/r3
Landing Page
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Resource 3:
C++ File
description: Code for NN and CC regions in SimpleAnalysis, location: ANA-SUSY-2018-30.cxx
License: CC0
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Resource 4:
HistFactory File
Archive of full likelihoods in the HistFactory JSON format
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10.17182/hepdata.95928.v2/r5
Landing Page
Download

HEPData – Additional Resources

These can be accessed by clicking the associated *Landing Page* or *Download* buttons.



HEPData – Additional Resources (Landing Page)

HEPData

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Measurements of Higgs boson production cross section in the four-lepton final state in proton-proton collisions at $\sqrt{s} = 13.6$ TeV

The CMS collaboration

Chekhovskiy, Vladimir , Hayrapetyan, Aram , Makarenko, Vladimir , Tumasyan, Armen , Adam, Wolfgang , Andrejkovic, Janik Walter , Benato, Lisa , Bergauer, Thomas , Chatterjee, Suman , Damanakis, Konstantinos

CMS-HIG-24-013, 2025.

Abstract (data abstract)
CERN LHC. Measurements of Higgs boson production cross sections in the four-lepton final state at 13.6 TeV.

CMS-HIG-24-013_Figure_001-a.png <https://www.hepdata.net/r>

License: CC0
Image file

The figure consists of two plots. The top plot is a histogram showing the number of events per 5.0 GeV bin as a function of the invariant mass of the four leptons ($m_{4\ell}$) in GeV. The x-axis ranges from 100 to 350 GeV, and the y-axis ranges from 0 to 80 Events/5.0 GeV. The data points are shown as black dots with error bars. The background components are stacked: Z+X (green, at the bottom), gg \rightarrow ZZ (dark blue), qq \rightarrow ZZ (light blue), and H(125) (red, appearing as a peak around 125 GeV). The total fit is shown as a black line. The bottom plot is a Data/MC ratio plot, showing the ratio of data to Monte Carlo simulation for each bin. The x-axis is the same as the top plot, and the y-axis ranges from 0 to 2. The data points are black dots with error bars, fluctuating around a horizontal line at 1.0.

HEPData – Data Formats

Input Format

YAML – Choice for native HEPData format.

```
name: "Table 1"
location: Data from Page 17 of preprint
description: The measured fiducial cross sections. The first
keywords: # used for searching, possibly multiple values for
- {name: reactions, values: [P P --> Z0 Z0 X]}
- {name: observables, values: [SIG]}
- {name: cmenergies, values: [7000.0]} # centre-of-mass ene
- {name: phrases, values: [Inclusive, Integrated Cross Sect
data file: data1.yaml
data_license: # (optional) you can specify a license for the
  name: "GPL 2"
  url: "url for license"
description: "Tell me about it. This can appear in the main
additional_resources: # (optional)
- location: "analysis_script.py"
  description: "Analysis script"
- location: "http://github.com/HEPData/hepdata"
  description: "Full source code for creating this data"
- location: "root_file.root"
  description: "Some file"
license: # (optional)
  name: 'GPL 2'
  url: "url for license"
  description: "Tell me about it. This can appear in the
```

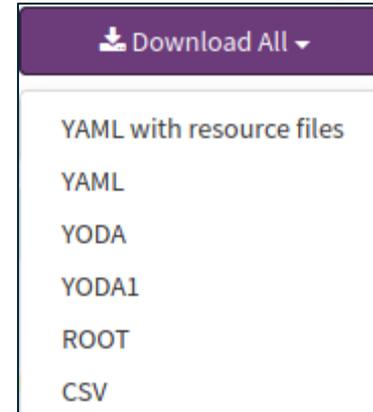
Output Format

JSON - JavaScript Object Notation

CSV - Comma-Separated Values

ROOT - Binary .root File

YODA - For inclusion in a Rivet analysis. (YODA2 and Legacy YODA)



HEPData - Licences

- HEPData Terms of Use:

Unless specified otherwise for selected datasets, all metadata and datasets in the HEPData service are made available under the terms of CC0.

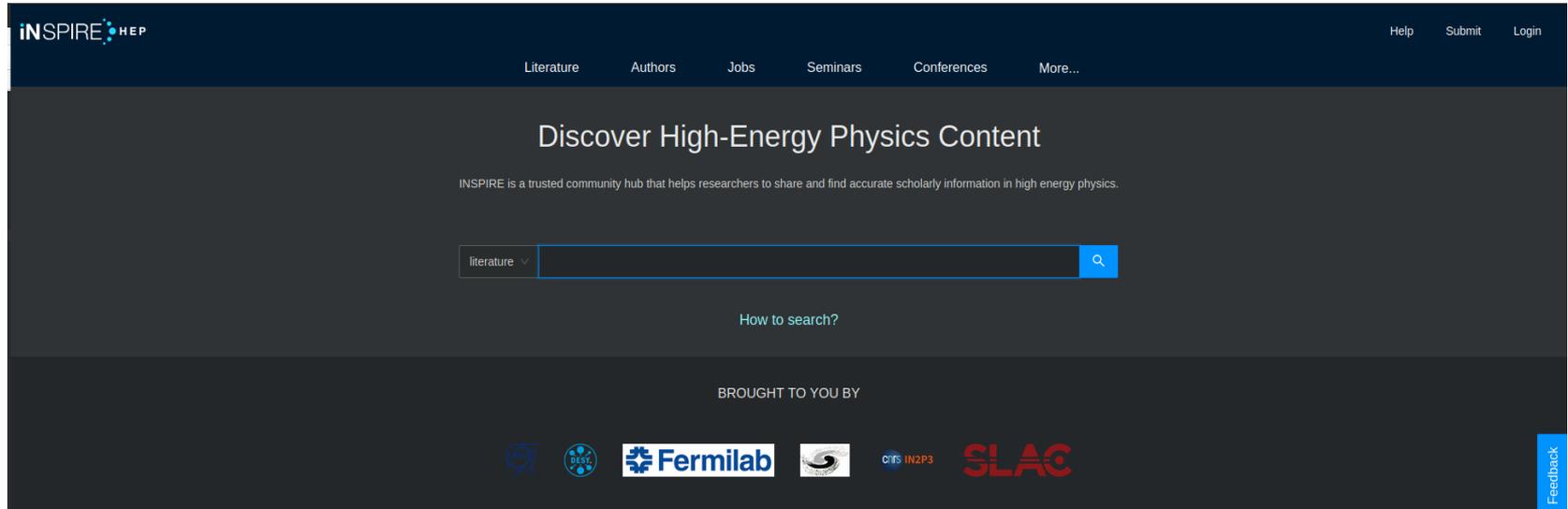
CC0 (aka CC Zero) is a public dedication tool, which enables creators to give up their copyright and put their works into the worldwide public domain. CC0 enables reusers to distribute, remix, adapt, and build upon the material in any medium or format, with no conditions.



NOTE: The user is free to specify a different license if desired.

HEPData – InspireHEP

- Main HEP literature platform - <https://inspirehep.net/>
- You must have an Inspire ID to finalise your HEPData submission
- HEPData submission is linked to an InspireHEP submission



The screenshot shows the InspireHEP website homepage. At the top left is the 'INSPIRE HEP' logo. The top navigation bar includes links for 'Literature', 'Authors', 'Jobs', 'Seminars', 'Conferences', and 'More...'. On the right side of the navigation bar are links for 'Help', 'Submit', and 'Login'. The main heading is 'Discover High-Energy Physics Content'. Below this is a sub-heading: 'INSPIRE is a trusted community hub that helps researchers to share and find accurate scholarly information in high energy physics.' A search bar is present with a dropdown menu set to 'literature' and a search icon. Below the search bar is a link 'How to search?'. At the bottom, it says 'BROUGHT TO YOU BY' followed by logos for CERN, DESY, Fermilab, IFTS IN2P3, and SLAC. A vertical 'Feedback' button is located on the right side of the page.

HEPData – Search

Search by text, phrase, keyword, abstract content etc. and using query strings



Search on title, abstract, or record abstract

Find all data with *collisions* in the **title**

`title:collisions`

Find all data with "*baryon production*" in the **abstract**

`abstract:"baryon production"`

Quotes force a full match.

Find all data with "*CERN-LHC*" in the **data abstract**

(i.e. the "*comment*" in the *submission.yaml* file)

`data_abstract:"CERN-LHC"`

Quotes force a full match.

Search by keywords

Find all data with the **phrase** *diffractive* or *elastic*

`phrases:diffractive OR phrases:elastic`

Find all data with the *PP* \rightarrow *LQ LQ X* **reaction**

`reactions:"P P --> L Q L Q X"`

Find data by **CM Energy** (in GeV):

`cmenergies:1.34`

`cmenergies:[1.3 TO 1.4]` (inclusive range, i.e. $1.3 \leq \sqrt{s} \leq 1.4$)

`cmenergies:{1.3 TO 1.4}` (exclusive range, i.e. $1.3 < \sqrt{s} < 1.4$)

`cmenergies:[1.3 TO 1.4]` (half-open range, i.e. $1.3 \leq \sqrt{s} < 1.4$)

Find all data with **observable** *ASYM*

`observables:ASYM`

HEPData - Search

The screenshot displays the HEPData search interface. At the top, the HEPData logo is on the left, and navigation links for 'About', 'Submission Help', 'File Formats', and 'Sign in' are on the right. A search bar contains the query 'data_abstract:"CERN-LHC"' with a 'Search' button and options for 'Reset search' and 'Advanced'. Below the search bar, filters for 'Max results', 'Sort by', and 'Reverse order' are visible, along with the text 'Showing 10 of 1090 results'. On the left side, there are three filter sections: 'Date' with a histogram from 2010 to 2025; 'Collaboration' with a list including ATLAS (452), CMS (352), ALICE (219), LHCb (58), and TOTEM (7); and 'Subject_areas' with a list including hep-ex (1051), nucl-ex (275), Instrumentation (5), Phenomenology-HEP (4), and nucl-th (4). Below these is a 'Phrases' section with 'Proton-Proton Scattering' (654), 'Inclusive' (608), and 'Cross Section' (318). The main content area shows three search results. The first result is titled 'Search for bottom-squark pair production in pp collision events at $\sqrt{s} = 13$ TeV with hadronically decaying τ -leptons, b-jets and missing transverse momentum using the ATLAS detector' by 'The ATLAS collaboration'. The second result is 'Measurements of Jet charge with dijet events in pp collisions at $\sqrt{s} = 8$ TeV' by 'The CMS collaboration'. The third result is 'Search for new physics with dijet angular distributions in proton-proton collisions at $\sqrt{s} = 13$ TeV' by 'The CMS collaboration'. Each result includes a brief abstract and a link to the data tables.

HEPData Submission

HEPData - Submission

TestHEPSubmission

A HEPData submission is a folder containing the following items:

- **Submission.yaml**
 - This contains core submission data, such as the abstract, additional resource file definitions, other metadata. Also contains a definition for each table, and any associated images/files.
- **Figure images**
 - Any images required for the data
- **Data files (.yaml)**
 - Files containing the data values.
- **Additional resources**
 - Additional files of use for the submission

TestHEPSubmission.zip

Name	Size	Type
root_file.root	1.2 MB	unknown
figFigure10B.png	100.0 kB	PNG image
figFigure8A.png	99.1 kB	PNG image
figFigure10A.png	98.1 kB	PNG image
figFigure8B.png	97.6 kB	PNG image
figFigure9A.png	90.5 kB	PNG image
figFigure9B.png	82.6 kB	PNG image
thumb_figFigure10B.png	29.5 kB	PNG image
thumb_figFigure8A.png	28.4 kB	PNG image
thumb_figFigure8B.png	28.3 kB	PNG image
thumb_figFigure10A.png	28.0 kB	PNG image
thumb_figFigure9A.png	25.0 kB	PNG image
thumb_figFigure9B.png	21.9 kB	PNG image
submission.yaml	9.6 kB	YAML document
analysis_script.py	4.2 kB	Python script
data1.yaml	1.2 kB	YAML document
data5.yaml	1.1 kB	YAML document
data3.yaml	1.0 kB	YAML document
data7.yaml	1.0 kB	YAML document
data6.yaml	934 bytes	YAML document
data4.yaml	867 bytes	YAML document
data8.yaml	863 bytes	YAML document
data2.yaml	356 bytes	YAML document

HEPData - Submission

What is YAML?

Our choice as native HEPData format, is a human-readable data format for data serialisation. Here we map it to our data structure. Uses tab indentation as a part of its formatting.

<https://yaml.org/>

```
name: "Table 1"
description: Describe the data. The more you say, the easier
keywords: # used for searching, possibly multiple values for
- {name: reactions, values: [P P --> Z0 Z0 X]}
- {name: observables, values: [SIG]}
- {name: cmenergies, values: [7000.0]}
- {name: phrases, values: [Inclusive, Integrated Cross Section]}
data_file: data1.yaml
```

HEPData – Submission submission.yml

Contains core submission information, including the abstract and any associated additional resources.

Also contains information about submission data files. Most importantly, their location.

Example of the submission-specific data within submission.yml (Above table information)

```
# Start a new submission. This section is optional for the provision
---
additional_resources: # additional references (e.g. experiment TWiki
- {location: "http://atlas.web.cern.ch/Atlas/GROUPS/PHYSICS/PAPERS/S
- location: "Likelihoods.tar.gz"
  description: "Archive of full likelihoods in the HistFactory JSON
  type: "HistFactory" # (optional) currently supports 'HistFactory'

comment: | # Information that applies to all data tables.
  CERN-LHC. Measurements of the cross section for ZZ production usi
---
```

HEPData Submission - submission.yml

There is a separate YAML "document" for each data table.

Note: A **document** is separated by the "---" indicator within the document.

Schema:

https://github.com/HEPData/hepdata-validator/blob/main/hepdata_validator/schemas/1.1.1/submission_schema.json



An example definition of a table within the submission.yml file:

```
---
# This is Table 3.
name: "Table 3"
location: Data from Figure 8A
description: Normalized ZZ fiducial cross section (multiplied by 10^6 for
keywords: # used for searching, possibly multiple values for each keyword
- {name: reactions, values: [P P --> Z0 Z0 X]}
- {name: observables, values: [DSIG/DPT]}
- {name: cmenergies, values: [7000.0]}
- {name: phrases, values: [Inclusive, Single Differential Cross Section,
data_file: data3.yaml
additional_resources:
- {description: Image file, location: figFigure8A.png}
- {description: Thumbnail image file, location: thumb_figFigure8A.png}
```

<https://hepdata-submission.readthedocs.io/en/latest/>

A HEPData Submission – Data Files

Data files, usually called *dataX.yml* contain the data values for an individual data table.

Can be encoded as either YAML or JSON

Defined in two parts:

1. Independent Variables (*X Axis*)
2. Dependent Variables (*Y Axis*)

- a. the *independent variables* (e.g. the x-axis of a plot);
- b. the *dependent variables* (the thing you're measuring, e.g. the y-axis of a plot).

data1.yml

```
independent_variables:
- header: {name: Leading dilepton PT, units: GEV}
  values:
  - {low: 0, high: 60}
  - {low: 60, high: 100}
  - {low: 100, high: 200}
  - {low: 200, high: 600}
dependent_variables:
- header: {name: 10**6 * 1/SIG(fiducial) * D(SIG(fiducial))/DPT, uni-
  qualifiers:
  - {name: RE, value: P P --> Z0 < LEPTON+ LEPTON- > Z0 < LEPTON+ LEI
  - {name: Sqrt(S), units: GEV, value: 7000}
  values:
  - value: 7000
    errors:
    - {symerror: 1100, label: stat}
    - {symerror: 79, label: 'sys,detector'}
    - {symerror: 15, label: 'sys,background'}
  - value: 9800
    errors:
    - {symerror: 1600, label: stat}
    - {symerror: 75, label: 'sys,detector'}
    - {symerror: 15, label: 'sys,background'}
  - value: 1600
    errors:
    - {symerror: 490, label: stat}
    - {symerror: 41, label: 'sys,detector'}
    - {symerror: 2, label: 'sys,background'}
  - value: 80
    errors:
    - {symerror: 60, label: stat}
    - {symerror: 2, label: 'sys,detector'}
    - {symerror: 0, label: 'sys,background'}
```

A HEPData Submission – Additional Resources

Other files:

- **Code:** .py/.cpp etc. Files
- **Analyses:** Files containing analysis results
- **Data:** .dat and other formats
- **URLs:** External resource links

HEPData Submission – Keywords

There are also some OPTIONAL keywords available for your data:

Current keywords are:

- cmenergies (GeV)
- observables
- phrases
- reactions

Example keyword definition within submission.yml

```
keywords: # used for searching, possibly multiple values for each keyw
- {name: reactions, values: [P P --> Z0 Z0 X]}
- {name: observables, values: [SIG]}
- {name: cmenergies, values: [7000.0]}
- {name: phrases, values: [Inclusive, Integrated Cross Section, Cross
```

HEPData Submission – Extra

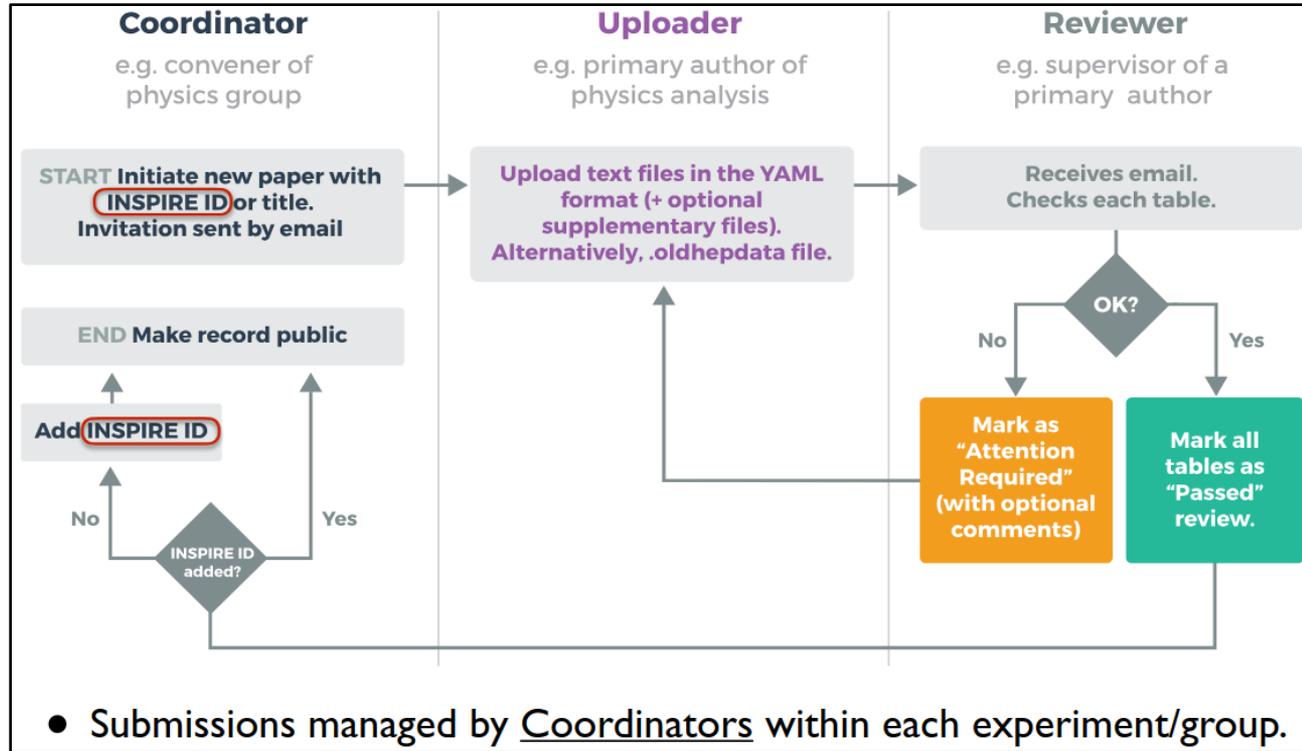
- You must already have an INSPIRE ID to finalise your submission. You can do the review process with only a provisional title.
- Your experiment group must have a coordinator, see <https://www.hepdata.net/permissions/coordinators> to see if your experiment group already has one, or you can apply to be one through your HEPData Dashboard.
- All HEPData YAML files are checked against the JSON schema contained in the [hepdata/hepdata-validator](#) repository.

- [Introduction](#)
- [Examples](#)
- [submission.yaml](#)
 - [Full Example](#)
- [Data Files](#)
 - [YAML data file example](#)
 - [Uncertainties](#)
 - [Correlation/covariance matrices](#)
 - [Two-dimensional measurements](#)
- [Single YAML files](#)
- [Keywords](#)
- [Tips](#)
- [Analyses](#)
 - [Rivet](#)
 - [MadAnalysis 5](#)
 - [SModelS](#)
 - [Combine](#)
 - [pyhf](#)
 - [NUISANCE](#)
- [Bidirectional linking](#)
 - [Linking tables](#)
 - [Linking records](#)

HEPData

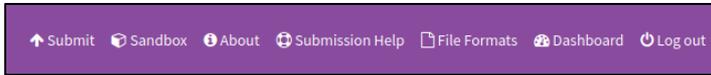
Creating a Submission

HEPData - Submission Process

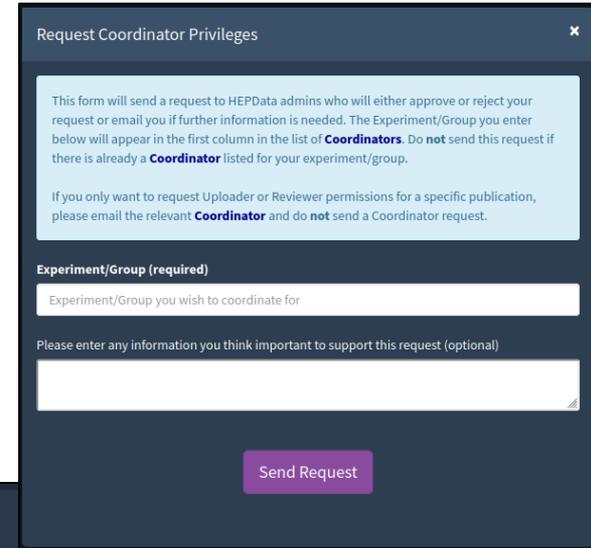
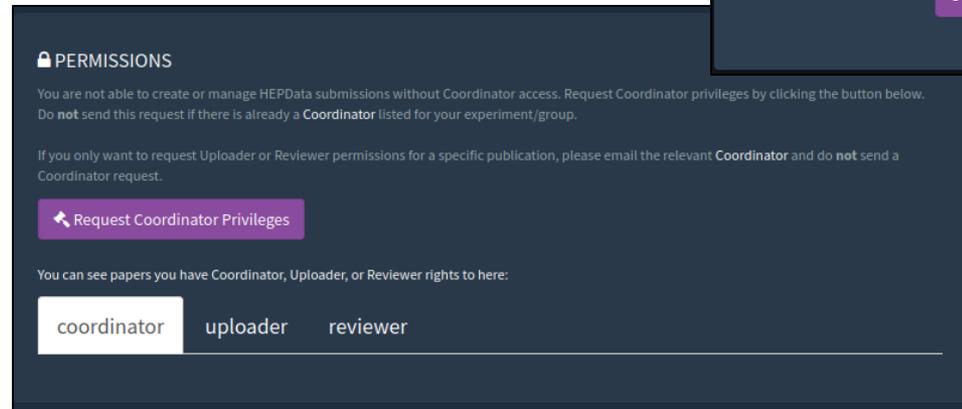


HEPData – Creating a Submission (As coordinator)

To create a new submission, use the "Submit" button on the top right (if you are a coordinator), of the HEPData.net webpage, which is located on the top toolbar.

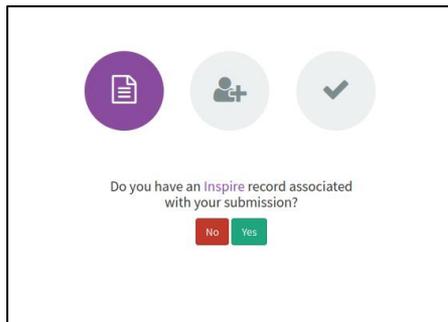


If you do not see the *Submit* button, then you need to become a coordinator. You can do this through the *Dashboard*.



HEPData – Creating a Submission (As coordinator)

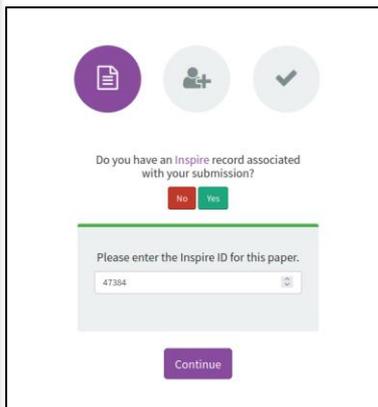
Do you have an inspire record?



Do you have an Inspire record associated with your submission?

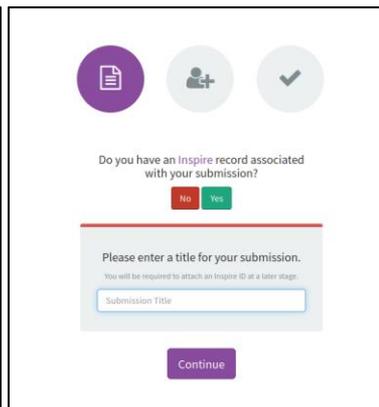
Yes: Enter Inspire ID
No: Entire title

NOTE: An Inspire ID is required to finalise the submission.



Do you have an Inspire record associated with your submission?

Please enter the Inspire ID for this paper.

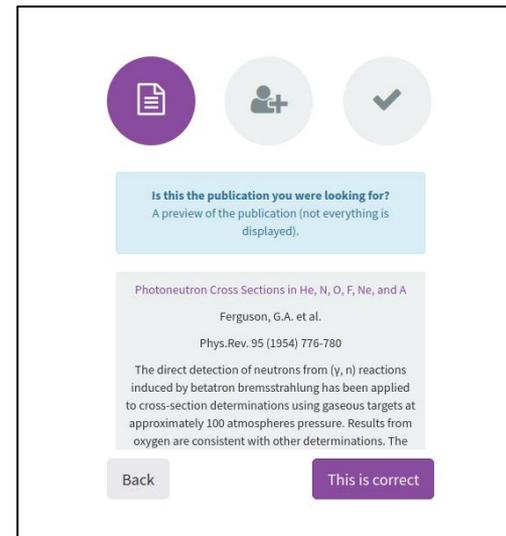


Do you have an Inspire record associated with your submission?

Please enter a title for your submission.

You will be required to attach an inspire ID at a later stage.

Yes: Confirm publication
No: Continues

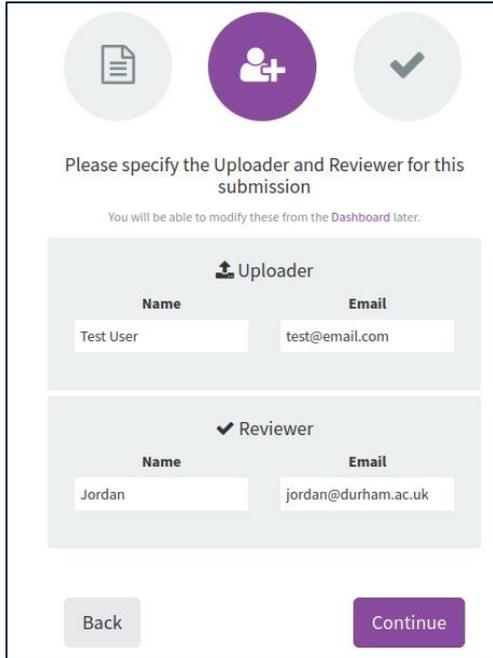


is this the publication you were looking for?
A preview of the publication (not everything is displayed).

Photoneutron Cross Sections in He, N, O, F, Ne, and A
Ferguson, G.A. et al.
Phys.Rev. 95 (1954) 776-780

The direct detection of neutrons from (γ, n) reactions induced by betatron bremsstrahlung has been applied to cross-section determinations using gaseous targets at approximately 100 atmospheres pressure. Results from oxygen are consistent with other determinations. The

HEPData – Creating a Submission (As coordinator)



Please specify the Uploader and Reviewer for this submission

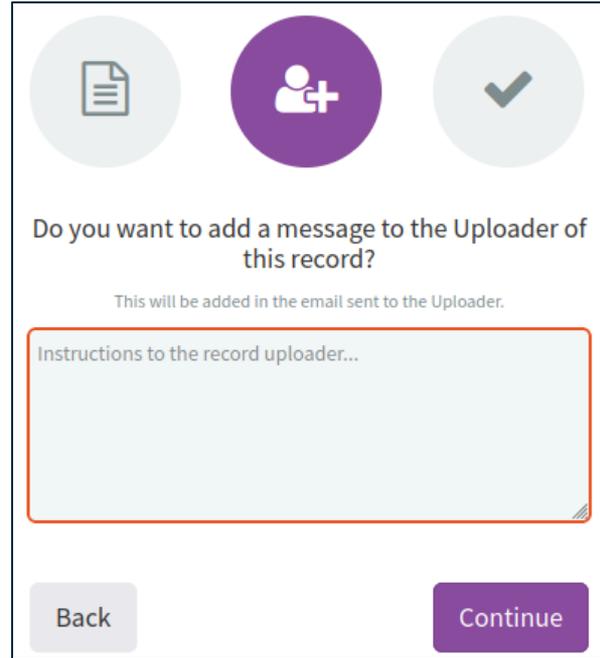
You will be able to modify these from the Dashboard later.

Uploader

Name	Email
<input type="text" value="Test User"/>	<input type="text" value="test@email.com"/>

Reviewer

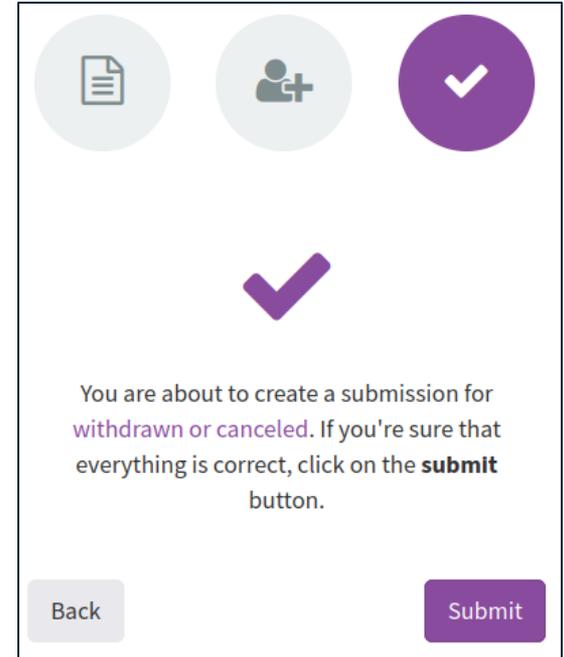
Name	Email
<input type="text" value="Jordan"/>	<input type="text" value="jordan@durham.ac.uk"/>



Do you want to add a message to the Uploader of this record?

This will be added in the email sent to the Uploader.

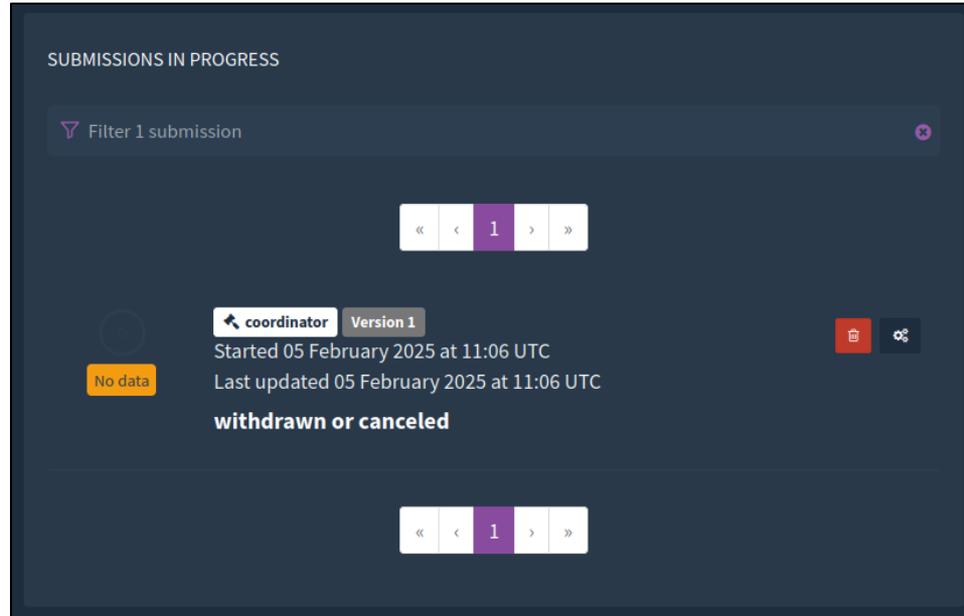
Instructions to the record uploader...



You are about to create a submission for **withdrawn or canceled**. If you're sure that everything is correct, click on the **submit** button.

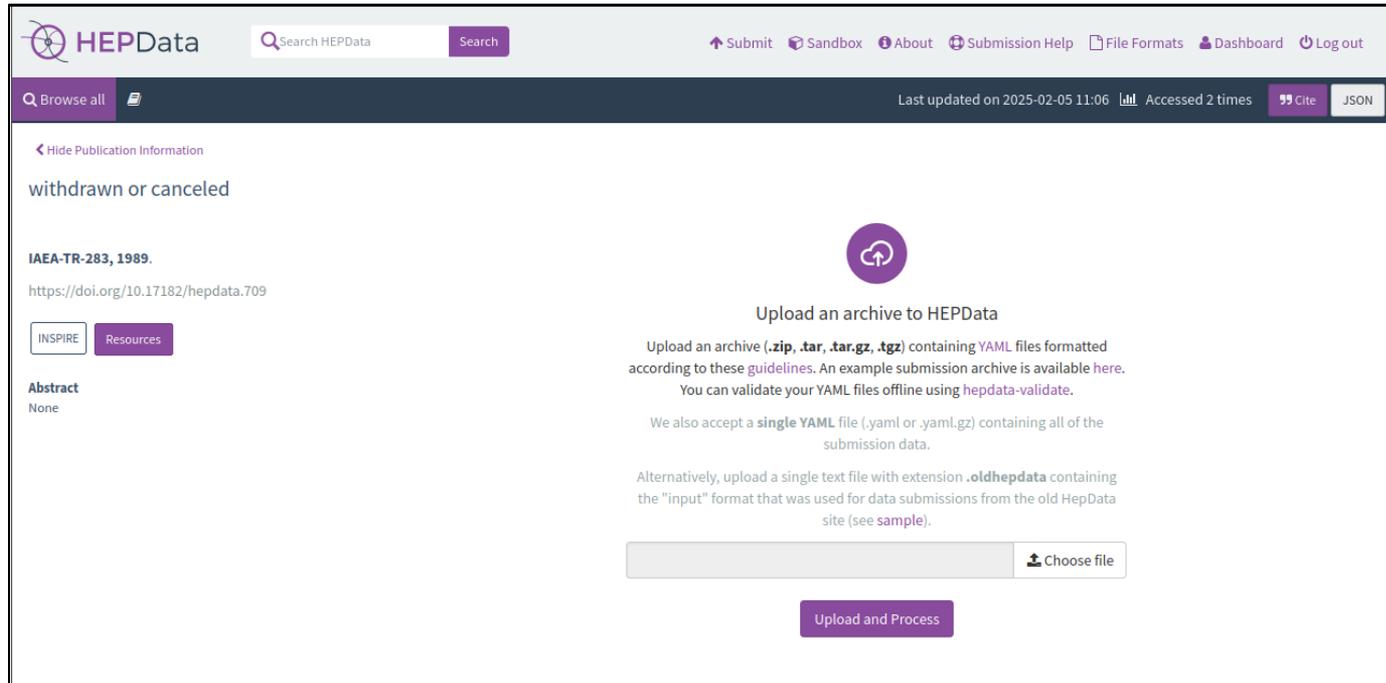
HEPData – Creating a Submission

Submission now available in the dashboard



The screenshot displays a dark-themed dashboard interface. At the top, the text "SUBMISSIONS IN PROGRESS" is visible. Below this is a search bar containing the text "Filter 1 submission". A pagination control shows "1" in a purple box, indicating the current page. The main content area features a submission card with a profile picture placeholder labeled "No data". To the right of the placeholder, the text reads "coordinator" with a left-pointing arrow icon, followed by "Version 1" in a grey box. Below this, the submission details are listed: "Started 05 February 2025 at 11:06 UTC" and "Last updated 05 February 2025 at 11:06 UTC". A red status box contains the text "withdrawn or canceled". On the right side of the card, there are two icons: a red trash can and a dark grey gear icon. A second pagination control is located at the bottom of the card, also showing "1" in a purple box.

HEPData – Creating a Submission



The screenshot shows the HEPData website interface. At the top, there is a navigation bar with the HEPData logo, a search bar, and links for Submit, Sandbox, About, Submission Help, File Formats, Dashboard, and Log out. Below the navigation bar, there is a secondary bar with 'Browse all', a date stamp 'Last updated on 2025-02-05 11:06', and buttons for 'Cite' and 'JSON'. The main content area features a purple arrow icon and the text 'Hide Publication Information'. The record title is 'withdrawn or canceled'. Below this, the record identifier 'IAEA-TR-283, 1989.' is shown, along with its DOI: 'https://doi.org/10.17182/hepdata.709'. There are two buttons: 'INSPIRE' and 'Resources'. The 'Abstract' section shows 'None'. The central part of the page is a large purple circle with a white refresh icon, followed by the heading 'Upload an archive to HEPData'. The text below explains that users should upload an archive (.zip, .tar, .tar.gz, .tgz) containing YAML files formatted according to guidelines, with a link to an example submission archive. It also mentions that single YAML files (.yaml or .yaml.gz) and .oldhepdata text files are accepted. At the bottom of this section, there is a file upload input field with a 'Choose file' button and a purple 'Upload and Process' button.

HEPData

Search HEPData

Submit Sandbox About Submission Help File Formats Dashboard Log out

Browse all

Last updated on 2025-02-05 11:06 Accessed 2 times Cite JSON

Hide Publication Information

withdrawn or canceled

IAEA-TR-283, 1989.

<https://doi.org/10.17182/hepdata.709>

INSPIRE Resources

Abstract
None

Upload an archive to HEPData

Upload an archive (.zip, .tar, .tar.gz, .tgz) containing YAML files formatted according to these [guidelines](#). An example submission archive is available [here](#). You can validate your YAML files offline using [hepdata-validate](#).

We also accept a **single YAML** file (.yaml or .yaml.gz) containing all of the submission data.

Alternatively, upload a single text file with extension **.oldhepdata** containing the "input" format that was used for data submissions from the old HepData site (see [sample](#)).

Choose file

Upload and Process

HEPData – Creating a Submission

Submission will then be processed.

You will receive an email confirming success or failure status after data validation.

Page will reload, displaying the record, or the upload screen again.

Schema available at:

https://github.com/HEPData/hepdata-validator/blob/main/hepdata_validator/schemas/1.1.1/submission_schema.json

Record 709 is currently being processed.

Please revisit this page later to see the full details.

This page will be automatically refreshed every 10 seconds.

You will receive an email when the submission has been processed.

A failed submission will delete all tables and return the upload page.

Details of the errors will be contained in the email sent to you.

Processing a submission can take several minutes or longer depending on the size.

Please contact info@hepdata.net if you need any further information.

HEPData – Creating a Submission

◀ Hide Publication Information

withdrawn or canceled

IAEA-TR-283, 1989.
<https://doi.org/10.17182/hepdata.709>

INSPIRE Resources

Abstract (data abstract)
 CERN-LHC. Measurements of the cross section for ZZ production using the 4l and 2l2mu decay channels in proton-proton collisions at a centre-of-mass energy of 7 TeV with 4.6 fb⁻¹ of data collected in 2011. The final states used are 4 electrons, 4 muons, 2 electrons and 2 muons, 2 electrons and missing transverse momentum, and 2 muons and missing transverse momentum (MET).

The cross section values reported in the tables should be multiplied by a factor of 1.0141 to take into account the updated value of the integrated luminosity for the ATLAS 2011 data taking period. The uncertainty on the global normalisation ("Lumi") remains at 1.8%. See Eur.Phys.J. C73 (2013) 2518 for more details.

The 4l channel fiducial region is defined as:
 - 4e, 4mu or 2e2mu

Notify Participants

Upload New Files

Approve All Tables

Download All

Filter 8 data tables

Table 1 10.17182/hepdata.709.v1/t1

Data from Page 17 of preprint
 10.17182/hepdata.709.v1/t1

The measured fiducial cross sections. The first systematic uncertainty is the combined systematic uncertainty excluding luminosity, the second is the...

to be reviewed

Table 2 10.17182/hepdata.709.v1/t2

Data from Page 20 of preprint
 10.17182/hepdata.709.v1/t2

The measured total cross sections. The first systematic uncertainty is the combined systematic uncertainty excluding luminosity, the second is the...

to be reviewed

Table 3 10.17182/hepdata.709.v1/t3

Data from Figure 8A
 10.17182/hepdata.709.v1/t3

Normalized ZZ fiducial cross section (multiplied by 10⁶ for readability) in values of the leading reconstructed dilepton pT for the...

to be reviewed

Table 4 10.17182/hepdata.709.v1/t4

Data from Figure 8B
 10.17182/hepdata.709.v1/t4

Normalized ZZ fiducial cross section (multiplied by

Table 1 10.17182/hepdata.709.v1/t1

License: GPL 2

Data from Page 17 of preprint

The measured fiducial cross sections. The first systematic uncertainty is the combined systematic uncertainty excluding luminosity, the second is the luminosity

cmenergies

7000.0

observables

SIG

phrases

Inclusive

Integrated Cross Section

Cross Section

reactions

P P -> Z0 Z0 X

RE	P P -> Z0 < LEPTON+ LEPTON-> Z0 < LEPTON+ LEPTON-> X	P P -> Z0 < LEPTON+ LEPTON-> Z0* < LEPTON+ LEPTON-> X	P P -> Z0 < LEPTON+ LEPTON-> Z0 < NU NUBAR > X
SQRT(S)	7000 GEV		
	SIG(fiducial) [FB]		
	25.4 ^{+3.8} _{-3.6} ^{stat} ^{+1.2} _{-1.0} ^{sys}	29.8 ^{+3.8} _{-3.8} ^{stat} ^{+1.7} _{-1.5} ^{sys}	12.7 ^{+3.1} _{-2.9} ^{stat} ^{+1.7} _{-1.6} ^{sys}
	^{+1.0} _{-1.0} ^{sys,lumi}	^{+1.2} _{-1.2} ^{sys,lumi}	^{+0.5} _{-0.5} ^{sys,lumi}

Visualize

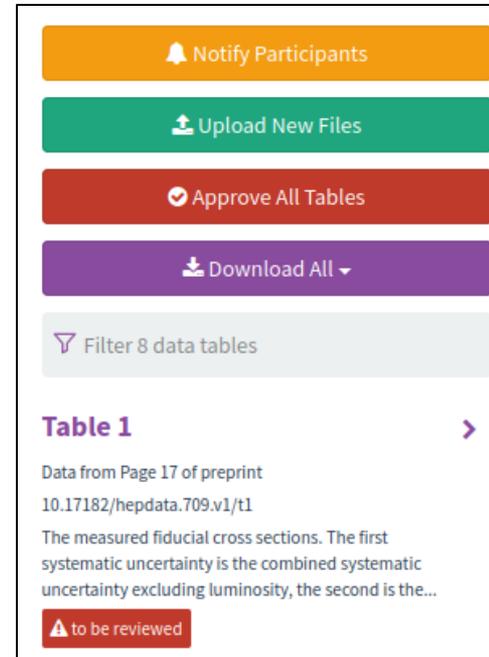
Sum errors Log Scale (X) Log Scale (Y)

Deselect variables or hide different error bars by clicking on them.

HEPData – Submission Reviewing

Review tools:

- Participant notification
- File reupload
- Mass/single table approval
- File download



The screenshot displays a vertical stack of action buttons for reviewing submissions:

- Notify Participants** (orange button with a bell icon)
- Upload New Files** (green button with an upload icon)
- Approve All Tables** (red button with a checkmark icon)
- Download All** (purple button with a download icon and a dropdown arrow)

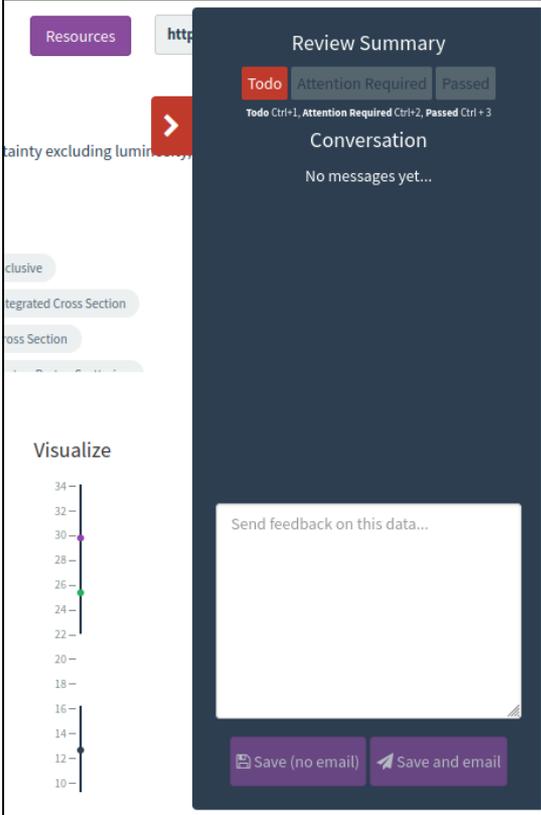
Below the buttons is a search bar labeled "Filter 8 data tables" with a funnel icon.

The first entry in the list is **Table 1**, which includes:

- A right-pointing chevron icon.
- Text: "Data from Page 17 of preprint 10.17182/hepdata.709.v1/t1"
- Text: "The measured fiducial cross sections. The first systematic uncertainty is the combined systematic uncertainty excluding luminosity, the second is the..."
- A red status badge with a warning triangle icon and the text "to be reviewed".

HEPData – Submission Reviewing

Review feedback and communication with reviewers through **Review Summary** widget.



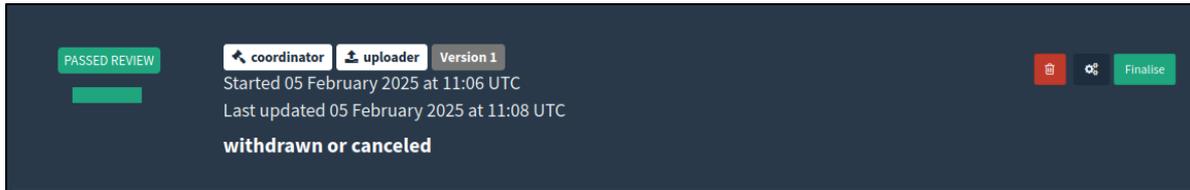
The screenshot shows a 'Review Summary' modal window overlaid on a data visualization. The modal has a dark blue background and contains the following elements:

- Review Summary** title
- Three status buttons: **Todo** (red), **Attention Required** (grey), and **Passed** (grey).
- Keyboard shortcuts: **Todo Ctrl+1, Attention Required Ctrl+2, Passed Ctrl+3**
- Conversation** section with the text "No messages yet..."
- A text input field with the placeholder "Send feedback on this data..."
- Two buttons at the bottom: **Save (no email)** and **Save and email**.

The background data visualization includes a 'Visualize' section with a vertical axis ranging from 10 to 34. The axis has tick marks every 2 units. There are three data points plotted: a purple dot at 30, a green dot at 25, and a black dot at 12. The background also shows a 'Resources' button and a 'http:' link.

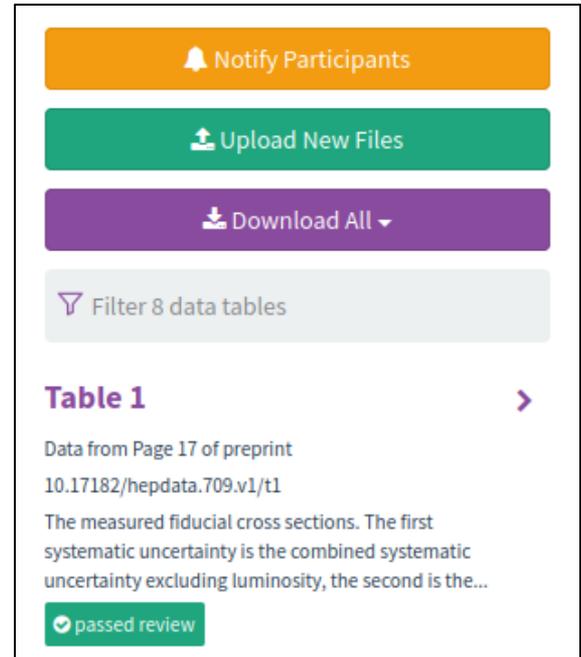
HEPData – Submission Review

After approval, there will now be a *finalize* button!
(You must assign an Inspire ID)



A dark blue horizontal bar containing submission details. On the left, a green box says 'PASSED REVIEW' above a green progress bar. To the right are buttons for 'coordinator', 'uploader', and 'Version 1'. Further right are icons for trash, settings, and a green 'Finalise' button. Below these are the dates: 'Started 05 February 2025 at 11:06 UTC' and 'Last updated 05 February 2025 at 11:08 UTC'. At the bottom, the text 'withdrawn or canceled' is displayed.

Your data is now linkable, accessible and searchable.



A vertical list of controls for a submission. At the top is an orange button 'Notify Participants'. Below it is a green button 'Upload New Files'. Then a purple button 'Download All' with a dropdown arrow. A light grey button 'Filter 8 data tables' with a funnel icon. Below this is a section for 'Table 1' with a right-pointing arrow. The table description includes: 'Data from Page 17 of preprint', the URL '10.17182/hepdata.709.v1/t1', and a paragraph: 'The measured fiducial cross sections. The first systematic uncertainty is the combined systematic uncertainty excluding luminosity, the second is the...'. At the bottom is a green button 'passed review' with a checkmark icon.

HEPData – GitHub

Located at: <https://github.com/HEPData>

- **hepdata:** Main web application
- **hepdata-validator:** JSON schema and validation code
- **hepdata-submission:** Documentation and examples
- **hepdata-converter:** YAML to CSV/ROOV/YODA converter
- **hepdata_lib:** Helps transform test/ROOT files to YAML
- **hepdata-cli:** Search/download/upload from CLI or API
- **miscellaneous:** Jupyter notebooks for various insights



Science and
Technology
Facilities Council



Thank you!

Contact - info@hepdata.net

<https://www.hepdata.net/>

<https://hepdata-submission.readthedocs.io/>