

DPHEP Workshop on
“the cost of curation”
lessons from
INSPIRE

Sünje Dallmeier-Tiessen

Salvatore Mele

CERN – Scientific Information Service



A preamble on “curation”



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MAT
MASSACHUSETTS
TECHNOLOGY, CAMBRIDGE, RES.

MATHEMATICAL
PHYSICS

C

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge.
Laboratory for Nuclear Science.
A note on the branching ratio $X^* \rightarrow X^* + \gamma$, by D.
Friedell, R. Deutsch, D. Cutts, R. Stiening and C. Wiegand.
December 1967. 10 p.

86

MIT-LNS-TR

2.F.O. 3.O. Martin
4.-S. auth. 6.W. Clyde
7.MIT-LNS.. 8.MIT 2098..

MIT 2098-389

Cataloguing of preprints...curation of the collection

...disambiguating authors, semantic tagging, resolving citations, marking up conference and teams...





...and curate index on a computer at SLAC: SPIRES

DATE: FRI, 13 DEC 91 17:55:53 GMT+0100
FROM: TIMBL@NXOC01.CERN.CH (TIM BERNERS-LEE)
SUBJECT: WWW TO SPIRES ON SLACVM - EXPERIMENTAL
TO: WWW-INTEREST@CERNVAX.CERN.CH, WWW-TALK@CERNVAX.CERN.CH

THERE IS AN EXPERIMENTAL W3 SERVER FOR THE SPIRES **HIGH ENERGY PHYSICS PREPRINT DATABASE**, THANKS TO TERRY HUNG, PAUL KUNZ AND LOUISE ADDIS OF SLAC. IT'S ONLY JUST BEEN PUT UP, SO DON'T EXPECT PERFECTION. WITH THE W3 LINE MODE BROWSER, FOLLOW A LINK TO IT FROM OUR HOME PAGE,

- TIM

PAUL KUNZ WROTE A FEW DAYS AGO:-

"THE SLAC LIBRARY MAINTAINER OF SPIRES DATABASES, LOUISE ADDIS, IS ABSOLUTELY DELIGHTED. SHE WILL ASK FOR A PERMANENT VM SERVICE MACHINE AND FINISH OFF THE POLISHING. THINGS ARE REALLY MOVING NOW."

INSPIRE

- Successor to SPIRES
- Transfer to new digital library software: Invenio
 - Plus articles full-text access/search
 - Plus author-centric services
 - Plus some data linkage (and hosting) services
- INSPIRE today supports DPHEP level 1 and 2

Cost of curation

- Lots of experience with curation, across labs
- Experimenting with different approaches (automated vs. manual vs. crowdsourcing)

Cost centers

- Technology – Platform
 - Migration
 - Maintenance and upgrade
- Technology – Curation tools and workflows
 - Design, develop, maintain, replace
 - Optimize for existing/limited/decreasing manpower
 - Crowdsourced tools (access vs usability vs trust)
- Human:
 - Curators/editors staff/students
 - Crowdsourcing

Curation

- Selection of content
 - **Core content: HEP**

plus material strongly related to high energy physics, from the following areas: Astrophysics, gravitation and cosmology, nuclear physics, other border areas such as condensed matter and atomic physics, and other selected areas
- Ingestion of different contents
 - Metadata standards/cleanup

Curation

- References and citations: historical bread 'n' butter and main burden
 - Extracted automatically, with improving tools
 - Manually cleaned/corrected
 - Users expect high level of (free!) service
 - Evaluation/jobs depend on it...
- Authors: automated parts and curator tasks
 - No standard tools to build on
 - Design/iterate algorithmic clustering, curation and crowd-sourcing apps
- Data: mainly manual curation/integration.
 - No automated ingestion tools
 - Multiple requests of “à la carte” linkage (HEPData, figshare, dataverse, GitHub)

Technology

- New tools for curation needed
 - Create the tools
 - Maintain and continuously update the tools
- Main tools:
 - Metadata cleaning and updating
 - Research data curation
 - Author curation

Curation tools: publications



record revision: 2013.12.15 14:33:56



Record Rec

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History

Ready

001		1222333	
005		20131215143356.0	
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<input type="checkbox"/> 242_	<input type="checkbox"/> a	Translated title (English)	
<input type="checkbox"/> 245_	<input type="checkbox"/> 9 <input type="checkbox"/> a	arXiv Centrality dependence of π , K, p production in Pb-Pb collisions at $\sqrt{s_{NN}} = 2.76$ TeV	

Curation tools: publications and data

	<input type="checkbox"/> a	Centrality dependence of $\{\pi\}$, K, p production in Pb-Pb collisions at $\sqrt{s_{NN}} = 2.76$ TeV	
<input type="checkbox"/> 260__	<input type="checkbox"/> c	2013-10-15	
<input type="checkbox"/> 269__	<input type="checkbox"/> c	2013-03-04	
<input type="checkbox"/> 300__	<input type="checkbox"/> a	42	
<input type="checkbox"/> 500__	<input type="checkbox"/> 9 <input type="checkbox"/> a	arXiv 42 pages, 17 figures, 6 tables, authors from page 36 to page 39. Version 2: minor wording updates after referee report; corrected error in the $\langle p_T \rangle$ uncertainty evaluation	
<input type="checkbox"/> 520__	<input type="checkbox"/> 9 <input type="checkbox"/> a	arXiv In this paper measurements are presented of π^{\pm} , K^{\pm} , p and \bar{p} production at mid-rapidity ($ \eta < 0.5$), in Pb–Pb collisions at $\sqrt{s_{NN}} = 2.76$ TeV as a function of centrality. The measurement covers the transverse momentum (p_T) range from 100, 200, 300 MeV/c up to 3, 3, 4.6 GeV/c, for π , K, and p respectively. The measured p_T distributions and yields are compared to expectations based on hydrodynamic, thermal and recombination models. The spectral shapes of central collisions show a stronger radial flow than measured at lower energies, which can be described in hydrodynamic models. In peripheral collisions, the p_T distributions are not well reproduced by hydrodynamic models. Ratios of integrated particle yields are found to be nearly independent of centrality. The yield of protons normalized to pions is a factor ~ 1.5 lower than the expectation from thermal models.	
<input type="checkbox"/> 520__	<input type="checkbox"/> 9 <input type="checkbox"/> a <input type="checkbox"/> h	HEPDATA abstract CERN-LHC. Measurements of charged pion, kaon and (anti)proton production at mid-rapidity in Pb-Pb collisions at $\sqrt{s_{NN}} = 2.76$ TeV recorded in the autumn of 2010 as a function of centrality. The measurements cover the transverse momentum (p_T) range from 100 MeV to 3 GeV for pions, 200 MeV to 3 GeV for kaons, and 300 MeV to 4.6 GeV for (anti)protons. These data extend previous	

Curation of “data”

The screenshot shows the INSPIRE HEP interface for record 1269185. The page includes a navigation bar with links for HEP, HEPNAMES, INSTITUTIONS, and CONFERENCES. On the left, there are several utility panels: Record (with search and submit buttons), Tickets (with a 'new ticket!' button), Fields (with add and delete buttons), View, Holding Pen, Undo/Redo, History (showing 'Ready'), and Display (with checkboxes for References, Authors, Others, and Curator view). The main content area displays a list of files associated with the record, with a 'record revision: 2013.12.15 14:24:28' header. Each file entry includes a file ID, a type code, and a description. Green plus icons are visible at the end of each row, indicating expandable content.

File ID	Type	Description
001		1269185
005		20131215142428.0
245_	9 a	HEPDATA Additional data from: Centrality dependence of π , K, p production in Pb-Pb collisions at $\sqrt{s_{NN}} = 2.76$ TeV
336_	t	DATASET
520_	9 h	HEPDATA pT-differential invariant yield of proton and antiproton for centrality 40-50%.
6531_	c k v	0
6531_	c r	1 PB PB --> P X
6531_	c k v	2 PB PB --> PBAR X
6531_	c k v	0
6531_	c c k v	1 2 SQRT(S)/NUCLEON 2760.0 GeV
6531_	c k v	0
6531_	c c k v	1 2 YRAP -0.5-0.5
710_	g	ALICE Collaboration
786_	h q r w	Figure 4C. 26 CERN-PH-EP-2013-019 1222333
8564_	u y	http://inspirehep.net/record/1269185/files/Data.txt data extracted from the table

Curating data – an example

[http://inspirehep.net/search?
ln=en&p=find+cn+atlas+and
+520%3Ahepdata&of=hb&action_search
h=Search](http://inspirehep.net/search?ln=en&p=find+cn+atlas+and+520%3Ahepdata&of=hb&action_search_h=Search)

Information

References (121)

Citations (16)

Files

Plots

HepData

Measurements of Higgs boson production and couplings in diboson final states with the ATLAS detector at the LHC

ATLAS Collaboration (Georges Aad (Freiburg U.) *et al.*) [Show all 2923 authors](#)

Jul 4, 2013 - 38 pages

Phys.Lett. B (2013)

DOI: [10.1016/j.physletb.2013.08.010](https://doi.org/10.1016/j.physletb.2013.08.010)

CERN-PH-EP-2013-103

e-Print: [arXiv:1307.1427](https://arxiv.org/abs/1307.1427) [hep-ex] | [PDF](#)Experiment: [CERN-LHC-ATLAS](#)

Abstract: Measurements are presented of production properties and couplings of the recently discovered Higgs boson using the decays into boson pairs, $H \rightarrow \gamma\gamma$, $H \rightarrow ZZ^* \rightarrow 4l$ and $H \rightarrow WW^* \rightarrow l\nu l\nu$. The results are based on the complete pp collision data sample recorded by the ATLAS experiment at the CERN Large Hadron Collider at centre-of-mass energies of $\sqrt{s}=7$ and $\sqrt{s}=8$ TeV, corresponding to an integrated luminosity of about 25 fb^{-1} . Evidence for Higgs boson production through vector-boson fusion is reported. Results of combined fits probing Higgs boson couplings to fermions and bosons, as well as anomalous contributions to loop-induced production and decay modes, are presented. All measurements are consistent with expectations for the Standard Model Higgs boson.

Note: 23 pages plus author list (38 pages total), 13 figures, 10 tables, submitted to Physics Letters B All figures including auxiliary figures are available at

<http://atlas.web.cern.ch/Atlas/GROUPS/PHYSICS/PAPERS/HIGG-2013-02/>

Keyword(s): INSPIRE: [* Automatic Keywords *](#) | [Higgs particle: production](#) | [Higgs particle: coupling](#) | [vector boson: fusion](#) | [p p: scattering](#) | [CERN LHC Coll](#) | [ATLAS](#) | [photon photon](#) | [decay modes](#) | [CERN Lab](#) | [lepton+](#) | [lepton](#)

Information References Citations Files Plots HepData

Measurements of Higgs boson production and couplings in diboson final states with the ATLAS detector at the LHC - ATLAS Collaboration (Aad, Georges *et al.*) Phys.Lett. B (2013) arXiv:1307.1427 [hep-ex] CERN-PH-EP-2013-103

THIS DATA COMES FROM [DURHAM HEPDATA PROJECT](#)

SUMMARY:

CERN-LHC. Measurements of the cross-section times branching ratio for a standard model-like Higgs boson. The results are based on the complete pp collision data sample recorded by the ATLAS experiment at the CERN Large Hadron Collider at centre-of-mass energies of $\sqrt{s} = 7$ TeV and $\sqrt{s} = 8$ TeV, corresponding to an integrated luminosity of about 25 fb⁻¹.

DATASETS:

Description: -2 log Likelihood for the H → γγ channel in the (μ_{ggF+tH} * B/BSM, μ_{VBF+VH} * B/BSM) plane for a Higgs boson mass m_H = 125.5 GeV.

[Go to the record](#)

Description: -2 log Likelihood for the H → ZZ* → 4l channel in the (μ_{ggF+tH} * B/BSM, μ_{VBF+VH} * B/BSM) plane for a Higgs boson mass m_H = 125.5 GeV.

[Go to the record](#)

Description: -2 log Likelihood for the H → WW* → lνlν channel in the (μ_{ggF+tH} * B/BSM, μ_{VBF+VH} * B/BSM) plane for a Higgs boson mass m_H = 125.5 GeV.

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Information Citations (1) Files

Data from Figure 7 from: Measurements of Higgs boson production and couplings in diboson final states with the ATLAS detector at the LHC

ATLAS Collaboration (Aad, Georges (Freiburg U.) [...]) [Show all 2923 authors](#)

Cite as: ATLAS Collaboration (2013) HepData, <http://doi.org/10.7484/INSPIREHEP.DATA.RF5P.6M3K>

Description: -2 log Likelihood for the $H \rightarrow ZZ \rightarrow 4l$ channel in the $(\mu_{ggF+ttH} * B/BSM, \mu_{VBF+VH} * B/BSM)$ plane for a Higgs boson mass $m_H = 125.5$ GeV.

Preview not available

Note: * Temporary entry *

This dataset complements the following publication:
[Measurements of Higgs boson production and couplings in diboson final states with the ATLAS detector at the LHC](#)

Record created 2013-09-11, last modified 2013-09-11

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- [atlas_prodModes_ggFttH_VBFVH_4l](#)
version 1 [atlas_prodModes_ggFttH_VBFVH_4l.root](#) [131.42 KB] 11 Sep 2013, 17:04
- [atlas_prodModes_ggFttH_VBFVH_4l.hep](#)
version 1 [atlas_prodModes_ggFttH_VBFVH_4l.hep.dat](#) [920.63 KB] 11 Sep 2013, 17:04

```
atlas_prodModes_ggFttH_VBFVH_4l.hep.dat
Path:HepData/ggFttH_VBFVH_4l
profiled Likelihood
x: #mu^{f}_{ggF+ttH}
y: #mu^{f}_{VBF+VH}
z: -2 ln (#Lambda)
x      y      z
1.32000000e-01 -1.48562500e+00 3.35528857e+01
1.96000000e-01 -1.48562500e+00 3.35528857e+01
2.60000000e-01 -1.48562500e+00 3.35528857e+01
3.24000000e-01 -1.48562500e+00 3.35528857e+01
3.88000000e-01 -1.48562500e+00 3.35528857e+01
4.52000000e-01 -1.48562500e+00 3.35528857e+01
5.16000000e-01 -1.48562500e+00 3.35528857e+01
5.80000000e-01 -1.48562500e+00 3.35528857e+01
6.44000000e-01 -1.48562500e+00 3.35528857e+01
7.08000000e-01 -1.48562500e+00 3.35528857e+01
7.72000000e-01 -1.48562500e+00 3.35528857e+01
8.36000000e-01 -1.48562500e+00 3.35528857e+01
9.00000000e-01 -1.48562500e+00 3.35528857e+01
9.64000000e-01 -1.48562500e+00 3.35528857e+01
1.02800000e+00 -1.48562500e+00 3.35528857e+01
1.09200000e+00 -1.48562500e+00 3.35528857e+01
1.15600000e+00 -1.48562500e+00 3.35528857e+01
1.22000000e+00 -1.48562500e+00 3.35528857e+01
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1.41200000e+00 -1.48562500e+00 3.35528857e+01
1.47600000e+00 -1.48562500e+00 3.35528857e+01
1.54000000e+00 -1.48562500e+00 3.35528857e+01
1.60400000e+00 -1.48562500e+00 3.35528857e+01
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1.79600000e+00 -1.48562500e+00 3.35528857e+01
-(DOS)--- atlas_prodModes_ggFttH_VBFVH_4l.hep.dat Top L1 (Fundamental)
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Cited by: 1 records

(2) [On the presentation of the LHC Higgs Results](#) - Boudjema, F. et al. arXiv:1307.5865 [hep-ph] [more](#)

.. of which self-citations: 0 records

Co-cited with: 55 records

- (1) [Higgs fits preference for suppressed down-type couplings: Implications for supersymmetry](#) - Azatov, Aleksandr et al. Phys.Rev. D86 (2012) 075033 arXiv:1206.1058 [hep-ph]
- (1) [Model-Independent Bounds on a Light Higgs](#) - Azatov, Aleksandr et al. JHEP 1204 (2012) 127, Erratum-ibid. 1304 (2013) 140 arXiv:1202.3415 [hep-ph]
- (1) [Updated measurements of the Higgs boson at 125 GeV in the two photon decay channel](#) - CMS Collaboration CMS-PAS-HIG-13-001
- (1) [Global Analysis of the Higgs Candidate with Mass ~ 125 GeV](#) - Ellis, John et al. JHEP 1209 (2012) 123 arXiv:1207.1693 [hep-ph] KCL-PH-TH-2012-28, LCTS-2012-14, CERN-PH-TH-2012-192
- (1) [Searches for New Physics: Les Houches Recommendations for the Presentation of LHC Results](#) - Kraml, S. et al. Eur.Phys.J. C72 (2012) 1976 arXiv:1203.2489 [hep-ph] FERMILAB-PUB-12-887-T [more](#)

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Publications list

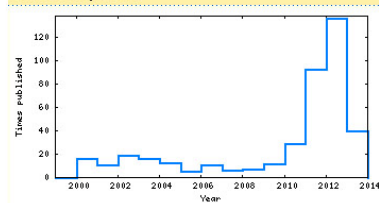
Publications in INSPIRE:

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6. [Search for microscopic black holes in a like-sign dimuon final state using large track multiplicity with the ATLAS detector](#)
7. [Search for direct third-generation squark pair production in final states with missing transverse momentum and two b-jets in \$\sqrt{s} = 8\$ TeV pp collisions with the ATLAS detector](#)

Documentos:

	All papers	Single authored
All papers	416	10
Book	0	0
ConferencePaper	26	8
Introductory	0	0
Lectures	0	0
Published	348	2
Review	5	0
Thesis	1	1
Proceedings	1	0

Publications per year



Subject categories

Experiment-HEP (390)
Instrumentation (37)
Phenomenology-HEP (21)
Experiment-Nucl (9)
Computing (6)
General Physics (3)
Other (2)

Palabras clave frecuentes

ATLAS (286)
experimental results (267)
CERN LHC Coll (264)
7000 GeV-cms (194)
p p: scattering (140)
p p: interaction (75)
CERN LEP Stor (74)
electron positron: colliding beams (69)
ALEPH (68)
electron positron: annihilation (66)
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Citations (from papers in INSPIRE)

Citations summary

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416 papers found, 406 of them citeable (published or arXiv)

Citation summary results	Citeable papers	Published only
Total number of papers analyzed:	406	348
Total number of citations:	27,502	25,605
Average citations per paper:	67.7	73.6
Breakdown of papers by citations:		
Renowned papers (500+)	7	6
Famous papers (250-499)	8	8
Very well-known papers (100-249)	36	34
Well-known papers (50-99)	57	57
Known papers (10-49)	203	196
Less known papers (1-9)	74	45
Unknown papers (0)	21	2
h_{HEP} index [?]	72	70

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HepNames data

Kyle S. Cranmer (New York U.)
[\[Author Profile\]](#) [\[Google\]](#) [\[Students\]](#) [\[arXiv\]](#) [\[ADS\]](#)

PhD Advisor: Wu, Sau Lan
PhD Institution: Wisconsin U., Madison
Undergrad: Rice U.
Email: cranmer@cern.ch
URL: <http://physics.as.nyu.edu/object/KyleCranmer.html>
URL: <http://twitter.com/KyleCranmer>
Field: HEP-EX, HEP-PH, PHYSICS
Experiment: FNAL-E-0830, CERN-LHC-ATLAS, CERN-LEP-ALEPH, FNAL-TEV-CDF
Author Profile: [K.S.Cranmer.1](#)
Inspire ID: INSPIRE-00074922

Institutional History:

Institution	Rank	Start Date	End Date	UPDATE
New York U.	SENIOR	2007		
Brookhaven	PD	2005	2007	
Wisconsin U., Madison	PHD	1999	2005	
Rice U.	UG	1995	1999	

Variants del nombre

Cranmer, Kyle S. (8)
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Afiliaciones

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New York University (1)
CERN (1)
Washington U., Seattle (1)
City Coll., N.Y. (1)
NYU (1)
[more](#)

Frequent co-authors (excluding collaborations)

W.Quayle.1 (13)
B.Mellado.1 (12)
I.Aracena.1 (11)
S.L.Wu.1 (11)
B.Vachon.1 (10)
C.T.Potter.1 (10)
S.H.Robertson.1 (10)
S.J.Hillier.1 (10)
A.Negri.1 (9)
C.P.Bee.1 (9)
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Collaborations

ATLAS Collaboration (282)
ALEPH Collaboration (71)
DELPHI Collaboration (5)
L3 Collaboration (5)
OPAL Collaboration (5)
CDF Collaboration (4)
ATLAS (3)
LEP Electroweak Working Group (2)
ATLAS Collaboration (1)
ALEPH (1)
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Information References (54) Citations (0) Files Plots

Search for dark matter in events with a hadronically decaying W or Z boson and missing transverse momentum in pp collisions at $\sqrt{s}=8$ TeV with the ATLAS detector

ATLAS Collaboration (Georges Aad (Freiburg U.), Tatevik Abajyan (Bonn U.), Brad Abbott (Oklahoma U.), Jalal Abdallah (Barcelona, IFAE), Samah Abdel Khalek (Orsay, LAL), Ovsat Abidinov (Baku, Inst. Phys.), Rosemarie Aben (FOM, Amsterdam), Babak Abi (Oklahoma State U.), Maris Abolins (Michigan State U.), Ossama AbouZeid (Toronto U.), Halina Abramowicz (Tel Aviv U.), Henso Abreu (IRFU, Saclay), Yiming Abulaiti (Stockholm U. & Stockholm U., OKC), Bobby Samir Acharya (King's Coll. London), Leszek Adamczyk (AGH-UST, Cracow), David Adams (Brookhaven), Tetteh Ady Adelmann (Yale U.), Stefanie Adomeit (Munich U.), Tim Adye (Rutherford), Scott Aefsky (Brandeis U.), Ta (VINCA Inst. Nucl. Sci., Belgrade), Juan Antonio Aguilar-Saavedra (CAFPE, Granada & LIP, Lisbon), Marco A. Steven Ahlen (Boston U.), Ashfaq Ahmad (SUNY, Stony Brook), Faig Ahmadov (Dubna, JINR & Baku, Inst. of Southern Methodist U.), Giulio Aielli (INFN, Rome & Rome U., Tor Vergata), Torsten Paul Ake Åkesson (Lund U., ICEPP), Andrei Akimov (Lebedev Inst.), Muhammad Aftab Alam (Royal Holloway, U. of London), Justin A. Albrand (LPSC, Grenoble), Maria Josefina Alconada Verzini (La Plata U.), Martin Aleksa (CERN), Igor Ali Franco Alessandria (INFN, Milan), Calin Alexa (Bucharest, IFIN-HH), Gideon Alexander (Tel Aviv U.), Gauthier Theodoros Alexopoulos (Natl. Tech. U., Athens), Muhammad Alhroob (INFN, Udine & Udine U.), Malik A. Gianluca Alimonti (INFN, Milan), Lion Alio (Marseille, CPPM), John Alison (Chicago U., EFI), Benedict Allbr John Allison (Lancaster U.), Phillip Allport (Liverpool U.), Sarah Allwood-Spiers (Glasgow U.), John Almon Alosio (INFN, Naples & Naples U.), Raz Alon (Weizmann Inst.), Alejandro Alonso (Bohr Inst.), Francisco Al David Altheimer (Nevis Labs, Columbia U.), Barbara Alvarez Gonzalez (Michigan State U.), Mariagrazia Alv U.), Katsuya Amako (KEK, Tsukuba), Yara Amaral Coutinho (Rio de Janeiro Federal U.), Christoph Amelur Ammosov (Serpukhov, IHEP), Susana Patricia Amor Dos Santos (LIP, Lisbon), Antonio Amorim (LIP, Lis Simone Amoroso (Freiburg U.), Nir Amram (Tel Aviv U.), Glenn Amundsen (Brandeis U.), Christos Anast Stefan Ancu (Bern U., LHEP), Nansi Andari (CERN), Timothy Andeen (Nevis Labs, Columbia U.), Christoph U.), Gabriel Anders (Kirchhoff Inst. Phys.), Kelby Anderson (Chicago U., EFI), Attilio Andreazza (INFN, Mi Victor Andrei (Kirchhoff Inst. Phys.), Xabier Anduaga (La Plata U.), Stylianos Angelidakis (Athens U.), Philipp Anger (Dresden, Tech. U.), Aaron Angerami (Nevis Labs, Columbia U.), Francis Anghinolfi (CERN), Alexey Anisenkov (Novosibirsk, IYF), Nuno Anjos (LIP, Lisbon), Alberto Annovi (Frascati), Ariadni Antonaki (Athens U.), Mario Antonelli (Frascati), Alexey Antonov, Jaroslav Antos (Kosice, IEF), Fabio Anulli (INFN, Rome), Masato Aoki (Nagoya U.), Ludovica Aperia Bel

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The radiation hardness test on CsI(Tl) crystals for BESIII

Boxiang Yu, Cheng Yuan, Janguang Lu, Li Zhou, Gang Qin, Zhenghua A. Zhi-gang Wang, Jijun Sun, Jian Fang, Lei Shang *et al.* [Show all 13 authors](#)

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Zhi-Gang Wang

Aug 2, 2013 - 13 pages

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Fusion and one-neutron stripping reactions in the $9\text{Be} + 186\text{W}$ system above the Coulomb barrier

Y.D. Fang, P.R.S. Gomes, X.H. Zhou, Y.H. Zhang, J.L. Han, M.L. Liu, J.G. Wang, Y.H. Qiang, Z.G. Wang, X.G. Wu *et al.* [Show all 14 authors](#)

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Some introspection... 1/3

- Does technology/automated services lower curation costs?
 - Automated reference extraction helps
 - ... but more and diverse content comes in, and expectations increase
 - Authors: technology enables a connection between person and papers.
 - ... but higher visibility results in more request for manual curation

Some introspection... 2/3

- Who can/should/would curate?
 - The crowd vs. trained personnel?
 - The authors vs. the users?
 - Who to trust?
 - Who 'understands'?
 - Who asks the right questions?

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- What data services (DPHEP level 2 and link to level 3)?
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 - Prototype vs. scaling
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