PDG Computing Highlights

Kirill Lugovsky
Physics Division
Lawrence Berkeley National Laboratory

Outline:

- Verification system
- pdgLive updates
- New administrative tools

Verification system

pdgverify.lbl.gov

PDG Verification — particle data group

Send Feedback
Help

Overseers	Papers to verify	in prep.	done
Barnett, Michael (BARNETT)	**1**	17	0
Bettini, Alessandro (BETTINI)	**12**	8	5
Cerri, Alessandro (CERRI)	0	2	0
Dreiner, Herbi (DREINER)	**5**	10	0
Eidelman (MESONTEAM)	0	19	0
Grunewald, Martin, Gurtu, Atul (GURTU/GRUN)	0	10	0
Heinemeyer, Sven (HEINEMEYER)	**1**	23	0
Lin, Cheng-Ju (LIN)	0	6	0
Moenig, Klaus (MOENIG)	**1**	0	0
Other-review, Other-review (OTHER-REV)	0	0	0
QCD-review, QCD-review (QCD-REVIEW)	0	0	0

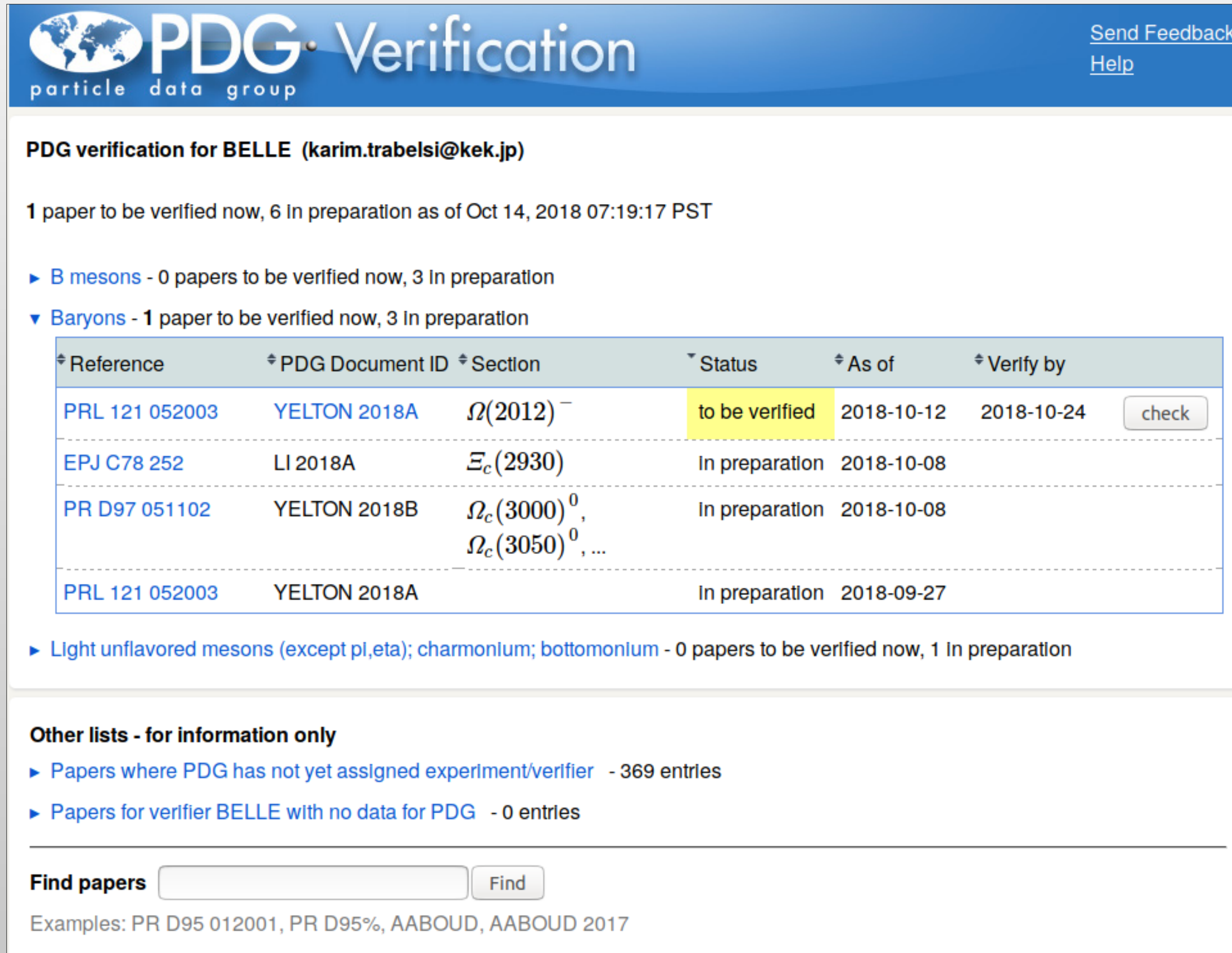
Verifiers	Papers to verify	in prep.	done
LHCB	**4**	3	1
CMS	**2**	43	0
BELLE	**2**	5	0
SEREBROV	**2**	0	0
JGOODMAN	**2**	0	0
ATLAS	**1**	29	0
BES3	**1**	14	0
BABAR	**1**	2	0
ZEUS	**1**	0	0
HESS	**1**	0	1
MAGIC	**1**	0	1

- New system allows verifiers to browse PDG data and annotate it with correction requests. PDG receives these requests as emails and as new tasks in PdgWorkspace
- Verification system is open to general public but requires access codes to enter correction requests
- ‘Help’ link to open detailed description

Verification system

- **List of papers to verify (example for verifier BELLE)**

- Links to new lists are sent automatically every week
- Lists contain all papers with completed encodings (to be verified) and papers in preparation
- Papers are grouped in physics area categories. Each category may have it's own 'subverifier'
- Paper is highlighted when deadline is near or passed
- 'check' buttons open data verification pages



PDG Verification
particle data group

Send Feedback
Help

PDG verification for BELLE (karim.trabelsi@kek.jp)

1 paper to be verified now, 6 in preparation as of Oct 14, 2018 07:19:17 PST

- B mesons - 0 papers to be verified now, 3 in preparation
- Baryons - **1** paper to be verified now, 3 in preparation

Reference	PDG Document ID	Section	Status	As of	Verify by	
PRL 121 052003	YELTON 2018A	$\Omega(2012)^-$	to be verified	2018-10-12	2018-10-24	check
EPJ C78 252	LI 2018A	$\Xi_c(2930)$	in preparation	2018-10-08		
PR D97 051102	YELTON 2018B	$\Omega_c(3000)^0$, $\Omega_c(3050)^0$, ...	in preparation	2018-10-08		
PRL 121 052003	YELTON 2018A		in preparation	2018-09-27		

- Light unflavored mesons (except pi,eta); charmonium; bottomonium - 0 papers to be verified now, 1 in preparation

Other lists - for information only

- Papers where PDG has not yet assigned experiment/verifier - 369 entries
- Papers for verifier BELLE with no data for PDG - 0 entries

Find papers Find

Examples: PR D95 012001, PR D95%, AABOUD, AABOUD 2017

Verification system

- **Data verification**
  - page displays all PDG information for selected paper
  - all data encoded from selected paper is marked in yellow
  - links on highlighted entries open editor fields for entering correction requests

PDG particle data group Verification

Send Feedback
Help

PDG verification for: PR C97 055503 (SEREBROV 2018) Verifier: SEREBROV — Back to SEREBROV verifications

Instructions:
- Please check everything marked in yellow.
- Click on pencil icon to enter corrections or use text field at the bottom for general comments or corrections.
- Submit your feedback using the buttons at the bottom of the page, indicating either that everything is correct or requesting changes to be made.
- Please reply by 24 Oct 2018.

Authors:
A.P. Serebrov, et al.
add comment

Collaboration:
PNPI,ILLG,RAL
add comment

Assigned sections:
n

n **MEAN LIFE** *in* n

Limits on lifetimes for *bound* neutrons are given in the section``p PARTIAL MEAN LIVES."

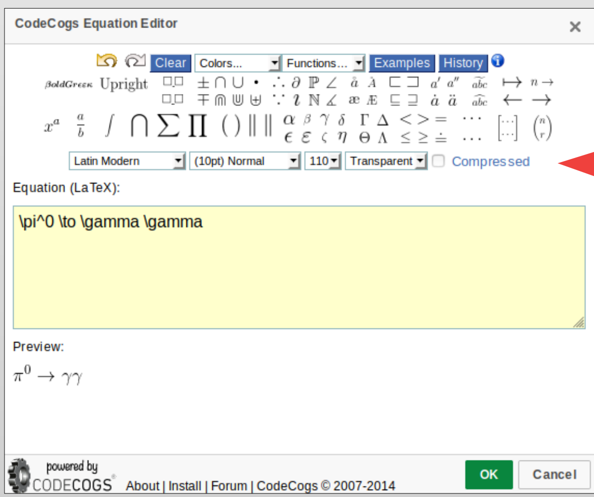
We average the best seven measurements. The result, 880.2 ± 1.0 s (including a scale factor of 1.9), is 5.5 seconds lower than the value we gave in 2010—a drop of 6.9 old and 5.5 new standard deviations.

For a full review of all matters concerning the neutron lifetime, see F.E. Wietfeldt and G.L. Greene, ``The neutron lifetime," Reviews of Modern Physics 83 1173 (2011). In particular, there is a full discussion of the experimental methods and results; and an average lifetime is obtained making several different selections of the results then available.

VALUE (s)	DOCUMENT ID		TECN	COMMENT
879.6 ± 0.8	**OUR AVERAGE** Error includes scale factor of 2.0.			
$878.3 \pm 1.6 \pm 1.0$	EZHOV	2018	CNTR	UCN magneto-gravit. trap
$877.7 \pm 0.7\ ^{+0.4}_{-0.2}$	1 PATTIE	2018	CNTR	UCN asym. magnetic trap
$881.5 \pm 0.7 \pm 0.6$	SEREBROV	2018	CNTR	UCN gravitational trap
add comment				
880.2 ± 1.2	2 ARZUMANOV	2015	CNTR	UCN double bottle
$887.7 \pm 1.2 \pm 1.9$	3 YUE	2013	CNTR	In-beam n, trapped p

Verification system

- **Data verification**
  - fields allow TeX and Richtext features
  - formula editor feature (‘***fx***’)



n **MEAN LIFE** *in n*

Limits on lifetimes for *bound* neutrons are given in the section``p PARTIAL MEAN LIVES."

We average the best seven measurements. The result, 880.2 ± 1.0 s (including a scale factor of 1.9), is 5.5 seconds lower than the value we gave in 2010—a drop of 6.9 old and 5.5 new standard deviations.

For a full review of all matters concerning the neutron lifetime, see F.E. Wietfeldt and G.L. Greene, ``The neutron lifetime," Reviews of Modern Physics 83 1173 (2011). In particular, there is a full discussion of the experimental methods and results; and an average lifetime is obtained making several different selections of the results then available.

VALUE (s)		*DOCUMENT ID*		*TECN*	*COMMENT*
$\mathbf{879.6 \pm 0.8}$		**OUR AVERAGE** Error includes scale factor of 2.0.			
$878.3 \pm 1.6 \pm 1.0$		EZHOV	2018	CNTR	UCN magneto-gravit. trap
$877.7 \pm 0.7\,^{+0.4}_{-0.2}$	1	PATTIE	2018	CNTR	UCN asym. magnetic trap
$881.5 \pm 0.7 \pm 0.6$		SEREBROV	2018	CNTR	UCN gravitational trap
880.2 ± 1.2	2	ARZUMANOV	2015	CNTR	UCN double bottle
$887.7 \pm 1.2 \pm 1.9$	3	YUE	2013	CNTR	In-beam n, trapped p
$882.5 \pm 1.4 \pm 1.5$	4	STEYERL	2012	CNTR	UCN material bottle
$880.7 \pm 1.3 \pm 1.2$		PICHLMAIER	2010	CNTR	UCN material bottle
$878.5 \pm 0.7 \pm 0.3$		SEREBROV	2005	CNTR	UCN gravitational trap
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$881.6 \pm 0.8 \pm 1.9$	5	ARZUMANOV	2012	CNTR	See ARZUMANOV 2015
$886.3 \pm 1.2 \pm 3.2$		NICO	2005	CNTR	See YUE 2013
$886.8 \pm 1.2 \pm 3.2$		DEWEY	2003	CNTR	See NICO 2005
$885.4 \pm 0.9 \pm 0.4$		ARZUMANOV	2000	CNTR	See ARZUMANOV 2012

OK ***fx*** **B**

Verification system

- **Data verification**

➢ general comment field – for corrections not associated to specific data entries

➢ submitting the response will mark paper as verified

➢ Verifiers can return to verified papers to update corrections or change their response

$876 \pm 10 \pm 19$	LAST	1988	SPEC	Pulsed beam
891 ± 9	SPIVAK	1988	CNTR	Beam
903 ± 13	KOSVINTSEV	1986	CNTR	UCN material bottle
937 ± 18	[8] BYRNE	1980	CNTR	
875 ± 95	KOSVINTSEV	1980	CNTR	
881 ± 8	BONDARENKO	1978	CNTR	See SPIVAK 1988
918 ± 14	CHRISTENSEN	1972	CNTR	

[1] PATTIE 2018 uses a new technique, with a semi-toroidal magneto-gravitational asymmetric trap and a novel in situ n-detector.

[2] ARZUMANOV 2015 is a reanalysis of their $2008 - 2010$ dataset, with improved systematic corrections of of ARZUMANOV 2000 and ARZUMANOV 2012 .

[3] YUE 2013 differs from NICO 2005 in that a different and better method was used to measure the neutron density in the fiducial volume. This shifted the lifetime by +1.4 seconds and reduced the previously largest source of systematic uncertainty by a factor of five.

[4] STEYERL 2012 is a detailed reanalysis of neutron storage loss corrections to the raw data of MAMPE 1989 , and it replaces that value.

[5] ARZUMANOV 2012 reanalyzes its systematic corrections in ARZUMANOV 2000 and obtains this corrected value.

[6] IGNATOVICH 1995 calls into question some of the corrections and averaging procedures used by MAMPE 1993 . The response, BONDARENKO 1996 , denies the validity of the criticisms.

[7] The NESVIZHEVSKII 1992 measurement has been withdrawn by A. Serebrov.

[8] The BYRNE 1980 measurement has been withdrawn (J. Byrne, private communication, 1990).

General comments or correction:

fx | **B** |

Your response:

This entry is OK - no changes needed

Submit corrections and send response to PDG

Verification system

- **Verifier's response sent to PDG**

➢ overseer receives correction request by email and as new task in Encoding System tasklist

(examples)

PDG verification for: PR D96 112012 (ABLIKIM 2017AK) Verifier: BES3 — Back to BES3 verifications

checked by Huijing Li (lihuijing@ihep.ac.cn) on 2018-03-07, corrections marked in red

General comments:

Here are our comments:
1. In the 'Assigned sections':
ψ(2S)= ψ(3686), not ψ(3685) in our paper.

2. The number of events for J/psi -> rho eta' is (3621-145)=3476, which is continuum background subtracted;
3. The number of events for psi(3686)-> rho eta' is (211-68)=143 for destructive-interference case, (148-68)=80 for constructive interference case.

Other is right. Thank you!

Authors:	**Collaboration:**
M. Ablikim, et al.	BES III Collab.

$8) \to \pi^+\pi^-\eta'(958))/\Gamma_{\rm total}$ Γ_{15}/Γ

DOCUMENT ID		TECN	COMMENT
1 ABLIKIM	2017AK	BES3	$J/\psi \to \pi^+\pi^-\eta'$

decay $J/\psi \to \pi^+\pi^-\eta'$.

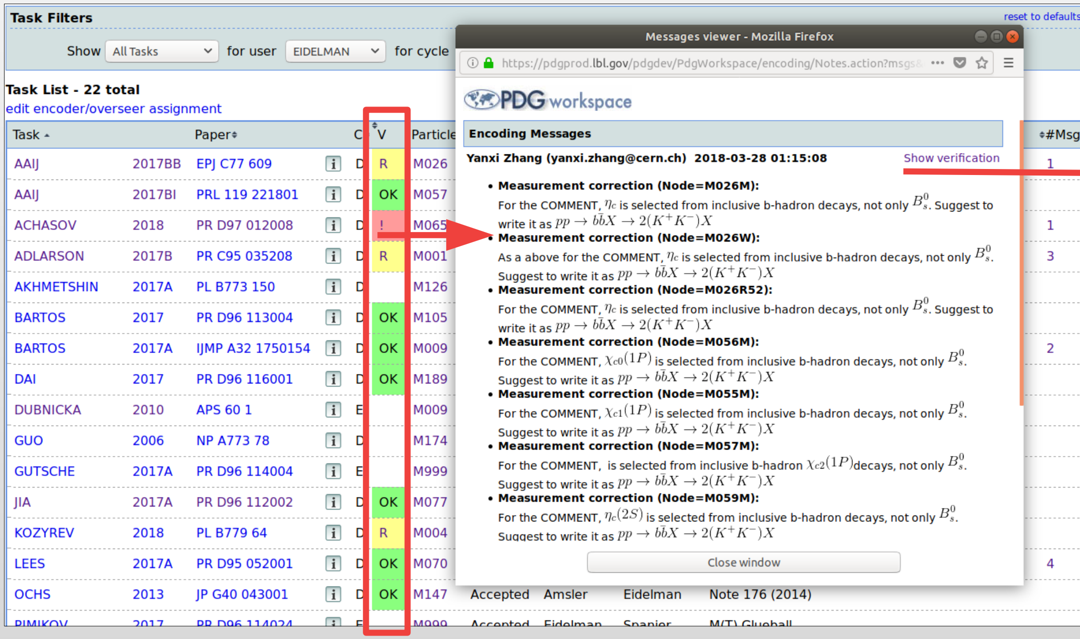
***W* MASS** *in W*

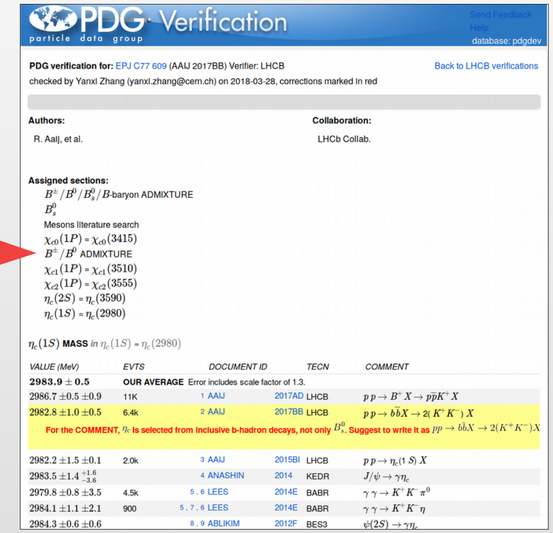
The W-mass listed here corresponds to the mass parameter in a Breit-Wigner distribution with mass-dependent width. To obtain the world average, common systematic uncertainties between experiments are properly taken into account. The LEP-2 average W mass based on published results is 80.376 ± 0.033 GeV [SCHAEL 2013A]. The combined Tevatron data yields an average W mass of 80.387 ± 0.016 GeV [AALTONEN 2013N]. A combination of the LEP average with this Tevatron average and the ATLAS value [AABOUD 2018J], assuming a common systematic error of 7 MeV between the latter two [Jens Erler, 52nd Rencontres de Moriond EW, March 2017], the world average W mass of 80.379 ± 0.012 GeV is obtained. OUR FIT quotes this value for the W mass.

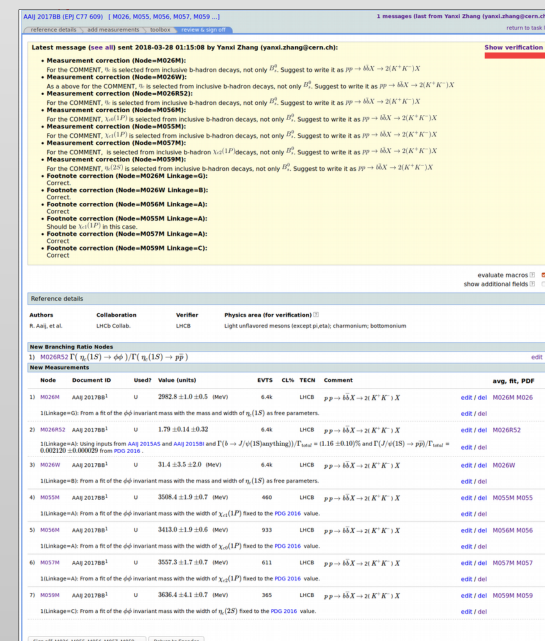
VALUE (GeV)	EVTS	DOCUMENT ID		TECN	COMMENT
80.379 ± 0.012	**OUR FIT**				
$80.370 \pm 0.007 \pm 0.017$	13.7M	1 AABOUD	2018J	ATLS	$E^{pp}_{\rm cm}$ = 7 TeV
On page 55 of the paper, we give the uncertainties with one more digit precision: 80369.5 ± 6.8 MeV(stat.) ± 10.6 MeV(exp. syst.) ± 13.6 MeV(mod. syst.). Adding 10.6 and 13.6 in quadrature, leads to 17.2 so the rounded value should be 17 MeV					
80.375 ± 0.023	2177k	2 ABAZOV	2014N	D0	$E^{p\bar p}_{\rm cm}$ = 1.96 TeV
80.387 ± 0.019	1095k	3 AALTONEN	2012E	CDF	$E^{p\bar p}_{\rm cm}$ = 1.96 TeV
$80.336 \pm 0.055 \pm 0.039$	10.3k	4 ABDALLAH	2008A	DLPH	$E^{ee}_{\rm cm}$ = $161 - 209$ GeV
$80.415 \pm 0.042 \pm 0.031$	11830	5 ABBIENDI	2006	OPAL	$E^{ee}_{\rm cm}$ = $170 - 209$ GeV
$80.270 \pm 0.046 \pm 0.031$	9909	6 ACHARD	2006	L3	$E^{ee}_{\rm cm}$ = $161 - 209$ GeV
$80.440 \pm 0.043 \pm 0.027$	8692	7 SCHAEL	2006	ALEP	$E^{ee}_{\rm cm}$ = $161 - 209$ GeV
80.483 ± 0.084	49247	8 ABAZOV	2002D	D0	$E^{p\bar p}_{\rm cm}$ = 1.8 TeV
80.433 ± 0.079	53841	9 AFFOLDER	2001E	CDF	$E^{p\bar p}_{\rm cm}$ = 1.8 TeV

Verification system

- **Verifications display for overseers**



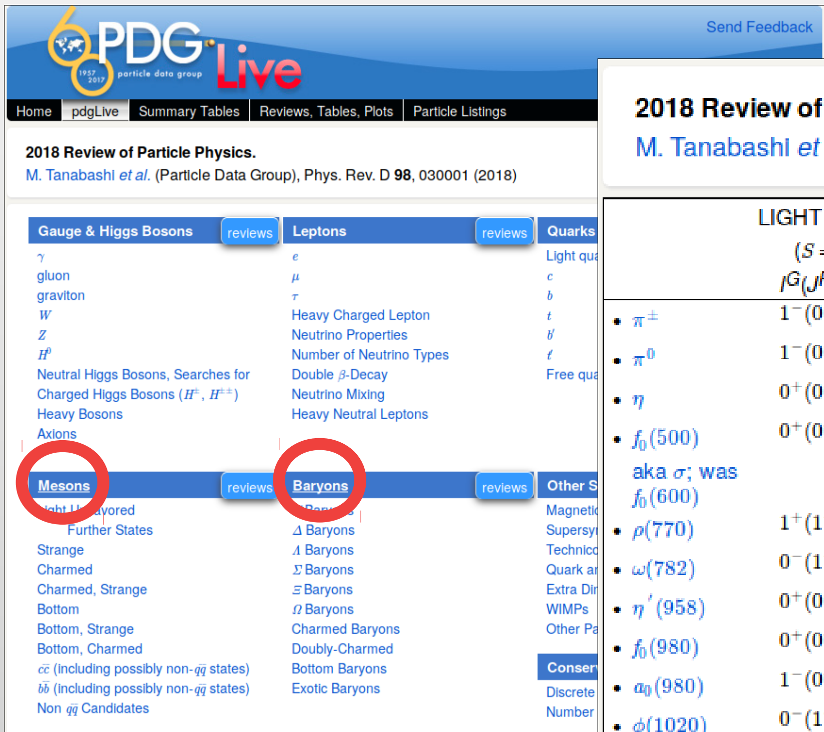




Overseers can see correction requests in their tasklists and in task sign-off pages

pdgLive update

- **Other highlights: Meson and Baryon summary pages in pdgLive**



2018 Review of Particle Physics.
M. Tanabashi *et al.* (Particle Data Group), Phys. Rev. D **98**, 030001 (2018)

LIGHT UNFLAVORED ($S = C = B = 0$)

	$I^G(J^{PC})$		$I^G(J^{PC})$
• $\pi^\pm$	$1^-(0^-)$	• $\rho_3(1690)$	$1^+(3^{--})$
• π^0	$1^-(0^{-+})$	• $\rho(1700)$	$1^+(1^{--})$
• η	$0^+(0^{-+})$	$a_2(1700)$	$1^-(2^{++})$
• $f_0(500)$ aka σ; was $f_0(600)$	$0^+(0^{++})$	• $f_0(1710)$	$0^+(0^{++})$
• $\rho(770)$	$1^+(1^{--})$	$\eta(1760)$	$0^+(0^{-+})$
• $\omega(782)$	$0^-(1^{--})$	• $\pi(1800)$	$1^-(0^{-+})$
• $\eta'(958)$	$0^+(0^{-+})$	$f_2(1810)$	$0^+(2^{++})$
• $f_0(980)$	$0^+(0^{++})$	$X(1835)$	$?^?(0^{-+})$
• $a_0(980)$	$1^-(0^{++})$	$X(1840)$	$?^?(?^{??})$
• $\phi(1020)$	$0^-(1^{--})$	• $\phi_3(1850)$	$0^-(3^{--})$
• $h_1(1170)$	$0^-(1^{+-})$	$\eta_2(1870)$	$0^+(2^{-+})$
• $b_1(1235)$	$1^+(1^{+-})$	• $\pi_2(1880)$	$1^-(2^{-+})$
• $a_1(1260)$	$1^-(1^{++})$	$\rho(1900)$	$1^+(1^{--})$
• $f_2(1270)$	$0^+(2^{++})$	$f_2(1910)$	$0^+(2^{++})$
• $f_1(1285)$	$0^+(1^{++})$	$a_0(1950)$	$1^-(0^{++})$
• $\eta(1295)$	$0^+(0^{-+})$	• $f_2(1950)$	$0^+(2^{++})$
• $\pi(1300)$	$1^-(0^{-+})$	$\rho_3(1990)$	$1^+(3^{--})$
• $a_2(1320)$	$1^-(2^{++})$	• $f_2(2010)$	$0^+(2^{++})$
• $f_0(1370)$	$0^+(0^{++})$	$f_0(2020)$	$0^+(0^{++})$
		• $a_4(2040)$	$1^-(4^{++})$
		• $f_4(2050)$	$0^+(4^{++})$
		$\pi_2(2100)$	$1^-(2^{-+})$
			$0^+(0^{++})$

STRANGE ($S = \pm1$, $C = B = 0$)

	$I(J^P)$
• $K^\pm$	$1/2(0^-)$
• K^0	$1/2(0^-)$
• K^0_S	$1/2(0^-)$
• K^0_L	$1/2(0^-)$
• $K^*_0(700)$ aka κ; was $K^*_0(800)$	$1/2(0^+)$
• $K^*(892)$	$1/2(1^-)$
• $K_1(1270)$	$1/2(1^+)$
• $K_1(1400)$	$1/2(1^+)$
• $K^*(1410)$	$1/2(1^-)$
• $K^*_0(1430)$	$1/2(0^+)$
• $K^*_2(1430)$	$1/2(2^+)$
$K(1460)$	$1/2(0^-)$
$K_2(1580)$	$1/2(2^-)$
$K(1630)$	$1/2(?^?)$
$K_1(1650)$	$1/2(1^+)$
• $K^*(1680)$	$1/2(1^-)$
• $K_2(1770)$	$1/2(2^-)$
• $K^*_3(1780)$	$1/2(3^-)$
• $K_2(1820)$	$1/2(2^-)$
$K(1830)$	$1/2(0^-)$

CHARMED, STRANGE ($C = S = \pm1$)

	$I(J^P)$
• $D^\pm_s$	$0(0^-)$
• $D^{*\pm}_s$	$0(?^?)$
• $D^*_{s0}(2317)^\pm$	$0(0^+)$
• $D_{s1}(2460)^\pm$	$0(1^+)$
• $D_{s1}(2536)^\pm$	$0(1^+)$
• $D^*_{s2}(2573)$	$0(2^+)$
• $D^*_{s1}(2700)^\pm$	$0(1^-)$
$D^*_{s1}(2860)^\pm$	$0(1^-)$
$D^*_{s3}(2860)^\pm$	$0(3^-)$
$D_{sJ}(3040)^\pm$	$0(?^?)$

BOTTOM ($B = \pm1$)

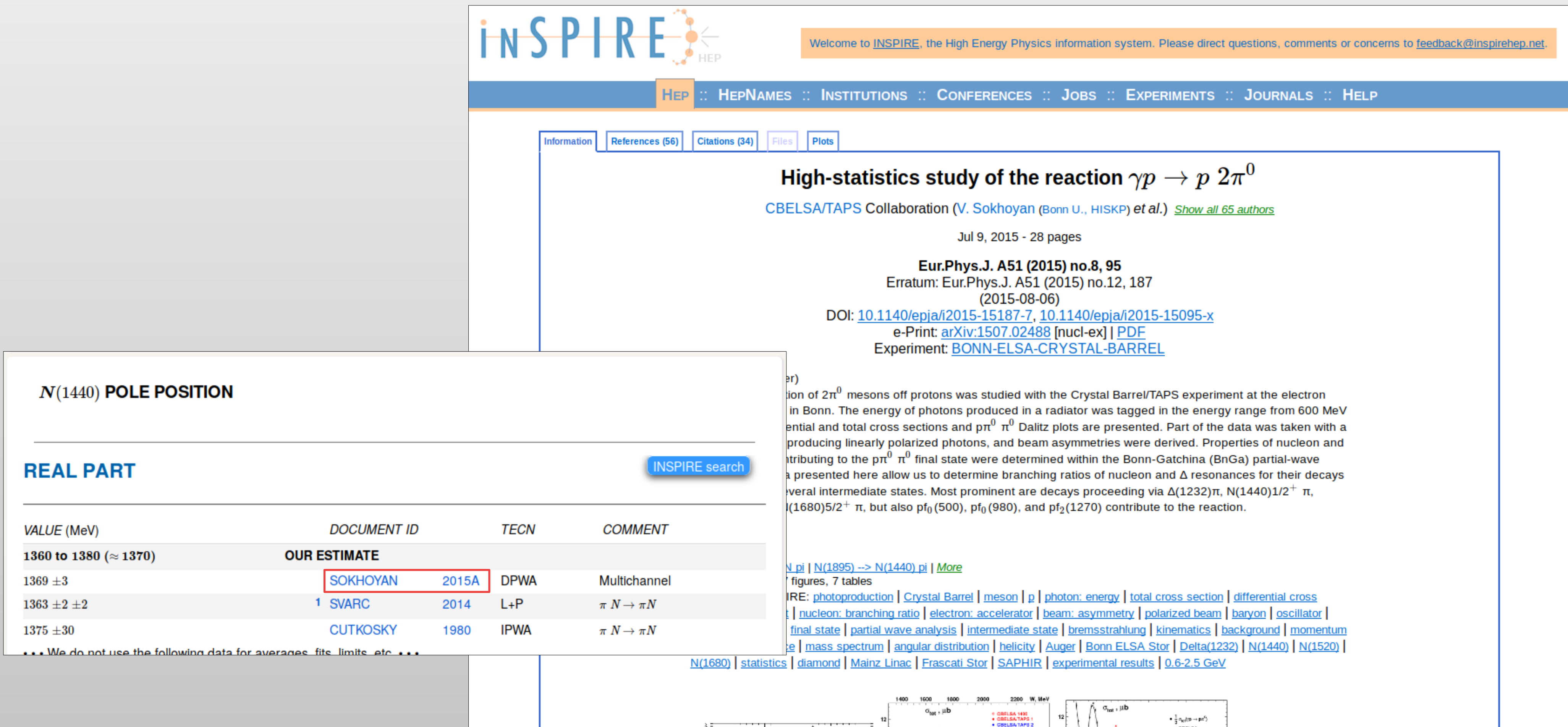
	$I(J^P)$
• $B^\pm$	$1/2(0^-)$
• B^0	$1/2(0^-)$
• $B^\pm/B^0$ ADMIXTURE	
• $B^\pm/B^0/B^0_s/b$-baryon ADMIXTURE	
V_{cb} and V_{ub} CKM Matrix Elements	
• B^*	$1/2(1^-)$
• $B_1(5721)^+$	$1/2(1^+)$
• $B_1(5721)^0$	$1/2(1^+)$

$c\bar{c}$ (including possibly non-$q\bar{q}$ states)

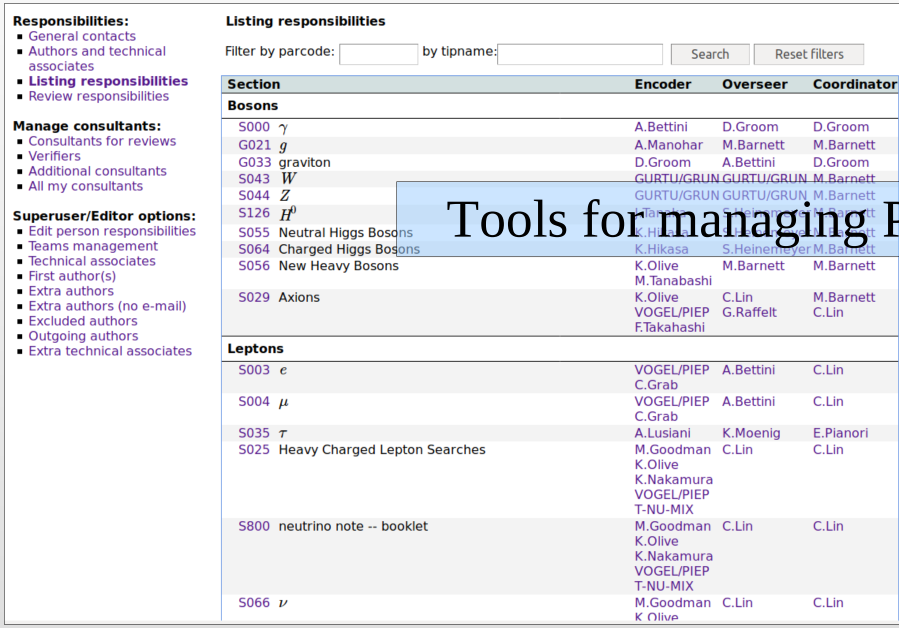
	$I^G(J^{PC})$
• $\eta_c(1S)$	$0^+(0^{-+})$
• $J/\psi(1S)$	$0^-(1^{--})$
• $\chi_{c0}(1P)$	$0^+(0^{++})$
• $\chi_{c1}(1P)$	$0^+(1^{++})$
• $h_c(1P)$	$?^?(1^{+-})$
• $\chi_{c2}(1P)$	$0^+(2^{++})$
• $\eta_c(2S)$	$0^+(0^{-+})$
• $\psi(2S)$	$0^-(1^{--})$
• $\psi(3770)$	$0^-(1^{--})$
• $\psi_2(3823)$ was $\psi(3823)$, $X(3823)$	$0^-(2^{--})$
$\chi_{c0}(3860)$	$0^+(0^{++})$
• $\chi_{c1}(3872)$ aka $X(3872)$	$0^+(1^{++})$
• $Z_c(3900)$ was $X(3900)$	$1^+(1^{+-})$
• $X(3915)$ was $\chi_{c0}(3915)$	$0^+(0$ or $2^{++})$
• $\chi_{c2}(3930)$ was $\chi_{c2}(2P)$	$0^+(2^{++})$
$X(3940)$	$?^?(?^{??})$
• $X(4020)$	$1^+(?^{?-})$

pdgLive update

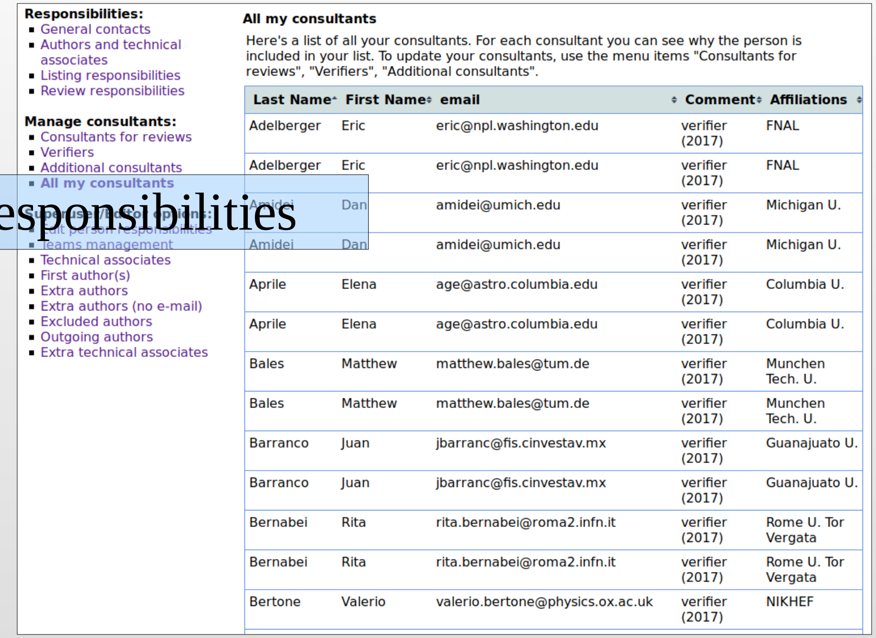
- **Other highlights: Inspire change forces new linking with pdgLive**
  - now automatically downloading paper info (title, bibtex id, ...)
  - linking directly to paper summary instead of Inspire search page

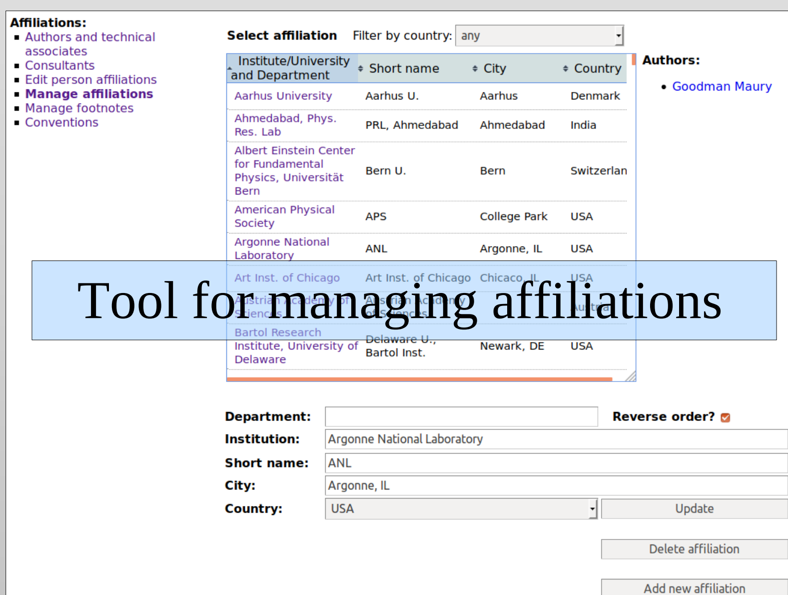


New administrative tools

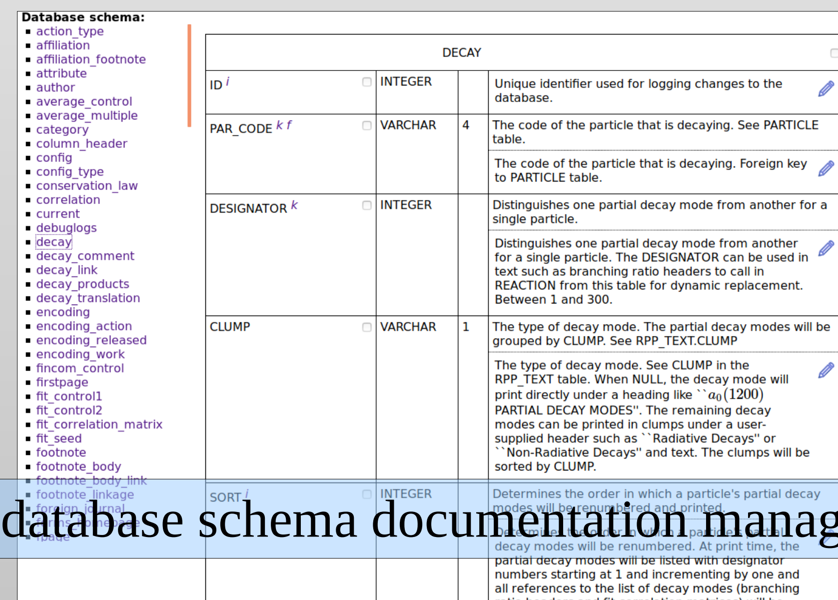


Tools for managing PDG responsibilities





Tool for managing affiliations



Tool for database schema documentation management

New administrative tools

- **New features in personal settings page**
  - add/edit affiliations

Affiliations:

1) Physics Division, Lawrence Berkeley National Laboratory, Berkeley, CA, United States of America (LBNL) — delete

2) COMPAS Group, Institute for High Energy Physics, Protvino, Russian Federation (COMPAS Group, IHEP) — delete

move up | move down | add affiliation

PDG workspace

Select affiliation

Filter by country: any

- To add an affiliation, click on the affiliation's name
- If you do not see your institute or would like to request a correction, please contact support
- For the convention of how PDG lists affiliations, see here

Institute/University and Department	Short name	City	Country
Aarhus University	Aarhus U.	Aarhus	Denmark
Ahmedabad, Phys. Res. Lab	PRL, Ahmedabad	Ahmedabad	India
American Physical Society	APS	College Park	USA
Argonne National Laboratory	ANL	Argonne, IL	USA
Art Inst. of Chicago	Art Inst. of Chicago	Chicaco, IL	USA
Austrian Academy of Sciences	Austrian Academy of Sciences		Austria
Austrian Academy of Sciences, Stefan Meyer Institute for Subatomic Physics	Stefan Meyer Inst.	Vienna	Austria

- edit Author ID

Author ID

If you know your ID in INSPIRE's HEPNames database (so-called INSPIRE ID) and/or your ORCID, please enter them below. If your ORCID is known by INSPIRE, it will be automatically retrieved when you enter your Inspire ID.

INSPIRE ID: INSPIRE - 00670362 check INSPIRE ID

ORCID: [ ] - [ ] - [ ] - [ ]

Save

Conclusions

- **Many new software tools developed during past 2 years**
  - Advanced new verification system
  - Extended pdgLive
  - Multiple administrative tools supporting group leader and editor
  - Several other tools already presented by Juerg and Piotr (reviews tool, encoding system extensions, …)
- **New tools have been essential to achieve necessary efficiency gains**