

PDG Computing Highlights

Kirill Lugovsky


Physics Division

Lawrence Berkeley National Laboratory

Outline:

- Verification system
- pdgLive updates
- New administrative tools


pdgverify.lbl.gov

 PDG Verification				Send Feedback Help	
particle data group					
Overseers <div> to verify In prep. done </div>				Verifiers <div> to verify In prep. done </div>	
Barnett, Michael (BARNETT)				LHCB	4 3 1
Bettini, Alessandro (BETTINI)				CMS	2 43 0
Cerrl, Alessandro (CERRI)				BELLE	2 5 0
Dreiner, Herbi (DREINER)				SEREBROV	2 0 0
Eidelman (MESONTEAM)				JGOODMAN	2 0 0
Grunewald, Martin, Gurtu, Atul (GURTU/GRUN)				ATLAS	1 29 0
Heinemeyer, Sven (HEINEMEYER)				BES3	1 14 0
Lin, Cheng-Ju (LIN)				BABAR	1 2 0
Moenig, Klaus (MOENIG)				ZEUS	1 0 0
Other-review, Other-review (OTHER-REV)				HESS	1 0 1
QCD-review, QCD-review (QCD-REVIEW)				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

- 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

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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	<input type="button" value="check"/>
EPJ C78 252	LI 2018A	$\Xi_c(2930)$	In preparation	2018-10-08		
PR D97 051102	YELTON 2018B	$\Omega_c(3000)^0, \Omega_c(3050)^0, \dots$	In preparation	2018-10-08		
PRL 121 052003	YELTON 2018A		In preparation	2018-09-27		

- ▶ **Light unflavored mesons (except π , η); 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

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

• 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 Verification
particle data group


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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 "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 n

- Data verification
 - fields allow TeX and Richtext features
 - formula editor feature ('fx')

CodeCogs Equation Editor

Equation (LaTeX): $\pi^0 \rightarrow \gamma \gamma$

Preview: $\pi^0 \rightarrow \gamma \gamma$

powered by CODECOGS

n MEAN LIFE in *n*

Limits on lifetimes for *bound* neutrons are given in the section "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.

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$877.7 \pm 0.7^{+0.4}_{-0.2}$	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 <i>n</i> , trapped <i>p</i>
$882.5 \pm 1.4 \pm 1.5$	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
$880.2 \pm 1.2 \pm 1.2$	BYRNE	1996	CNTR See BYRNE 1996

- **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 ±10 ±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:

f_x | **B** | $\frac{1}{2}$ | $\frac{3}{4}$ | $\frac{5}{6}$

Your response:

This entry is OK - no changes needed

Submit corrections and send response to PDG

- **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 Hulijing LI (lihulijing@ihep.ac.cn) on 2018-03-07, corrections marked in red

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

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

Other is right. Thank you!

Authors: M. Ablikim, et al.

Collaboration: BES III Collab.

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 [SCHAE 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 ± 0.007 ± 0.017	13.7M	1 AABOUD	2018J ATLS	$E_{\text{cm}}^{pp} = 7$ 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	$E_{\text{cm}}^{pp} = 1.96$ TeV
80.387 ± 0.019	1095k	3 AALTONEN	2012E CDF	$E_{\text{cm}}^{pp} = 1.96$ TeV
80.336 ± 0.055 ± 0.039	10.3k	4 ABDALLAH	2008A DLPH	$E_{\text{cm}}^{ee} = 161 - 209$ GeV
80.415 ± 0.042 ± 0.031	11830	5 ABBIENDI	2006 OPAL	$E_{\text{cm}}^{ee} = 170 - 209$ GeV
80.270 ± 0.046 ± 0.031	9909	6 ACHARD	2006 L3	$E_{\text{cm}}^{ee} = 161 - 209$ GeV
80.440 ± 0.043 ± 0.027	8692	7 SCHAE	2006 ALEP	$E_{\text{cm}}^{ee} = 161 - 209$ GeV
80.483 ± 0.084	49247	8 ABAZOV	2002D D0	$E_{\text{cm}}^{pp} = 1.8$ TeV
80.433 ± 0.079	53841	9 AFFOLDER	2001E CDF	$E_{\text{cm}}^{pp} = 1.8$ TeV

$J/\psi \rightarrow \pi^+ \pi^- \eta' (958)) / \Gamma_{\text{total}}$

Γ_{15} / Γ

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

Verifications display for overseers

Task Filters: Show All Tasks for user EIDELMAN for cycle

Task List - 22 total
edit encoder/overseer assignment

Task	Papers	C	V	Particle	#Msg
AAIJ	2017BB EPJ C77 609	1	D	R M026	1
AAIJ	2017BI PRL 119 221801	1	D	OK M057	1
ACHASOV	2018 PR D97 012008	1	D	! M065	1
ADLARSON	2017B PR C95 035208	1	D	R M001	3
AKHMETSHIN	2017A PL B773 150	1	D	M126	2
BARTOS	2017 PR D96 113004	1	D	OK M105	2
BARTOS	2017A IJMP A32 1750154	1	D	OK M009	2
DAI	2017 PR D96 116001	1	D	OK M189	2
DUBNICKA	2010 APS 60 1	1	E	M009	2
GUO	2006 NP A773 78	1	D	M174	2
GUTSCHE	2017A PR D96 114004	1	E	M999	2
JIA	2017A PR D96 112002	1	D	OK M077	2
KOZYREV	2018 PL B779 64	1	D	R M004	2
LEES	2017A PR D95 052001	1	D	OK M070	2
OCHS	2013 JP G40 043001	1	D	OK M147	2
PRIMIKOV	2017 PR D96 114024	1	D	M000	2

Messages viewer - Mozilla Firefox
https://pdgprod.lbl.gov/pdgview/PdgWorkspace/encoding/Notes.action?msgid=...

PDGworkspace

Encoding Messages

Yanxi Zhang (yanxi.zhang@cern.ch) 2018-03-28 01:15:08

• **Measurement correction (Node=M026M):**
For the COMMENT, η_c is selected from inclusive b-hadron decays, not only B_s^0 . Suggest to write it as $pp \rightarrow \bar{b}bX \rightarrow 2(K^+ K^-)X$.

• **Measurement correction (Node=M026W):**
As a above for the COMMENT, η_c is selected from inclusive b-hadron decays, not only B_s^0 . Suggest to write it as $pp \rightarrow \bar{b}bX \rightarrow 2(K^+ K^-)X$.

• **Measurement correction (Node=M026R52):**
For the COMMENT, η_c is selected from inclusive b-hadron decays, not only B_s^0 . Suggest to write it as $pp \rightarrow \bar{b}bX \rightarrow 2(K^+ K^-)X$.

• **Measurement correction (Node=M056M):**
For the COMMENT, $\chi_{c0}(1P)$ is selected from inclusive b-hadron decays, not only B_s^0 . Suggest to write it as $pp \rightarrow \bar{b}bX \rightarrow 2(K^+ K^-)X$.

• **Measurement correction (Node=M055M):**
For the COMMENT, $\chi_{c1}(1P)$ is selected from inclusive b-hadron decays, not only B_s^0 . Suggest to write it as $pp \rightarrow \bar{b}bX \rightarrow 2(K^+ K^-)X$.

• **Measurement correction (Node=M057M):**
For the COMMENT, $\chi_{c2}(1P)$ is selected from inclusive b-hadron decays, not only B_s^0 . Suggest to write it as $pp \rightarrow \bar{b}bX \rightarrow 2(K^+ K^-)X$.

• **Measurement correction (Node=M059M):**
For the COMMENT, $\eta_c(2S)$ is selected from inclusive b-hadron decays, not only B_s^0 . Suggest to write it as $pp \rightarrow \bar{b}bX \rightarrow 2(K^+ K^-)X$.

Close window

PDG Verification
particle data group
database: pdgview

PDG verification for: EPJ C77 609 (AAU 2017BB) Verifier: LHCB
checked by Yanxi Zhang (yanxi.zhang@cern.ch) on 2018-03-28, corrections marked in red

Authors: R. Aaij, et al. Collaboration: LHCB Collab.

Assigned sections:

$B^0 \rightarrow B^+ B^- / B^0 \rightarrow B^+ B^-$ baryon ADMIXTURE
 B_s^0
Mesons literature search
 $\chi_{c0}(1P) \rightarrow \chi_{c0}(3415)$
 $B^+ B^-$ ADMIXTURE
 $\chi_{c1}(1P) \rightarrow \chi_{c1}(3510)$
 $\chi_{c2}(1P) \rightarrow \chi_{c2}(3555)$
 $\eta_c(2S) \rightarrow \eta_c(3590)$
 $\eta_c(1S) \rightarrow \eta_c(2980)$

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
2983.9 ± 0.5	OUR AVERAGE			Error includes scale factor of 1.3.
2986.7 ± 0.5 ± 0.9	11K	1 AAIJ	2017AD LHCB	$pp \rightarrow B^+ X \rightarrow \bar{p} p K^+ X$
2982.8 ± 0.5 ± 0.5	6.4k	2 AAIJ	2017BB LHCB	$pp \rightarrow \bar{b}bX \rightarrow 2(K^+ K^-)X$
For the COMMENT, η_c is selected from inclusive b-hadron decays, not only B_s^0 . Suggest to write it as $pp \rightarrow \bar{b}bX \rightarrow 2(K^+ K^-)X$.				
2982.2 ± 1.5 ± 0.1	2.0k	9 AAIJ	2015BI LHCB	$pp \rightarrow \eta_c(1S)X$
2983.5 ± 1.4 ± 1.6	1.6	4 ANASHIN	2014 KEDR	$J/\psi \rightarrow \gamma \eta_c$
2979.8 ± 0.8 ± 3.5	4.5k	5, 6 LEES	2014E BABR	$\gamma \gamma \rightarrow K^+ K^- \pi^0$
2984.1 ± 1.1 ± 2.1	900	5, 7, 8 LEES	2014E BABR	$\gamma \gamma \rightarrow K^+ K^- \eta$
2984.3 ± 0.6 ± 0.6	6	8 ABLIKIM	2012F BES3	$\psi(2S) \rightarrow \gamma \eta_c$

AAU 2017BB (EPJ C77 609) (M026, M055, M056, M057, M059, ...)

Latest message (see all) sent 2018-03-28 01:15:08 by Yanxi Zhang (yanxi.zhang@cern.ch):

• **Measurement correction (Node=M026M):**
For the COMMENT, η_c is selected from inclusive b-hadron decays, not only B_s^0 . Suggest to write it as $pp \rightarrow \bar{b}bX \rightarrow 2(K^+ K^-)X$.

• **Measurement correction (Node=M026W):**
As a above for the COMMENT, η_c is selected from inclusive b-hadron decays, not only B_s^0 . Suggest to write it as $pp \rightarrow \bar{b}bX \rightarrow 2(K^+ K^-)X$.

• **Measurement correction (Node=M026R52):**
For the COMMENT, η_c is selected from inclusive b-hadron decays, not only B_s^0 . Suggest to write it as $pp \rightarrow \bar{b}bX \rightarrow 2(K^+ K^-)X$.

• **Measurement correction (Node=M056M):**
For the COMMENT, $\chi_{c0}(1P)$ is selected from inclusive b-hadron decays, not only B_s^0 . Suggest to write it as $pp \rightarrow \bar{b}bX \rightarrow 2(K^+ K^-)X$.

• **Measurement correction (Node=M055M):**
For the COMMENT, $\chi_{c1}(1P)$ is selected from inclusive b-hadron decays, not only B_s^0 . Suggest to write it as $pp \rightarrow \bar{b}bX \rightarrow 2(K^+ K^-)X$.

• **Measurement correction (Node=M057M):**
For the COMMENT, $\chi_{c2}(1P)$ is selected from inclusive b-hadron decays, not only B_s^0 . Suggest to write it as $pp \rightarrow \bar{b}bX \rightarrow 2(K^+ K^-)X$.

• **Footnote correction (Node=M026M Linkage-B):**
Correct.

• **Footnote correction (Node=M026W Linkage-A):**
Correct.

• **Footnote correction (Node=M055M Linkage-A):**
Correct.

• **Footnote correction (Node=M057M Linkage-A):**
Correct.

• **Footnote correction (Node=M059M Linkage-C):**
Correct.

Reference details

Authors	Collaboration	Verifier	Physics area (for verification)
R. Aaij, et al.	LHCB Collab.	LHCB	Light unflavored mesons (except ρ), charmonium, bottomonium

New Branching Ratio Nodes

1) M026R52 $\Gamma(\eta_c(1S) \rightarrow \phi \phi) / \Gamma(\eta_c(1S) \rightarrow \bar{p} p)$

New Measurements

Node	Document ID	Used?	Value (units)	EVTS	CLT	TECN	Comment	avg. fit. PDF
1) M026M	AAU 2017BB	u	2982.8 ± 0.5 ± 0.5 (MeV)	6.4k	u	LHCB	$pp \rightarrow \bar{b}bX \rightarrow 2(K^+ K^-)X$	avg. / def. M026M M026
10 Linkage-B)	From a fit of the ϕ invariant mass with the mass and width of $\eta_c(1S)$ as free parameters.							avg. / def.
2) M026R52	AAU 2017BB	u	1.79 ± 0.34 ± 0.32	6.4k	u	LHCB	$pp \rightarrow \bar{b}bX \rightarrow 2(K^+ K^-)X$	avg. / def. M026R52
10 Linkage-A)	Using inputs from AAU 2015AS and AAU 2015B and $\Gamma(0 \rightarrow J/\psi(S) \text{any}(X)) / \Gamma_{\text{total}} = (1.36 \pm 0.10) \text{ and } \Gamma(J/\psi(S) \rightarrow \bar{p} p) / \Gamma_{\text{total}} = (1.00210 \pm 0.00029) \text{ from PDG 2016.}$							avg. / def.
3) M026W	AAU 2017BB	u	31.4 ± 2.5 ± 2.0 (MeV)	6.4k	u	LHCB	$pp \rightarrow \bar{b}bX \rightarrow 2(K^+ K^-)X$	avg. / def. M026W
10 Linkage-B)	From a fit of the ϕ invariant mass with the mass and width of $\eta_c(1S)$ as free parameters.							avg. / def.
4) M055M	AAU 2017BB	u	3098.4 ± 1.9 ± 0.7 (MeV)	400	u	LHCB	$pp \rightarrow \bar{b}bX \rightarrow 2(K^+ K^-)X$	avg. / def. M055M M055
10 Linkage-A)	From a fit of the ϕ invariant mass with the width of $\chi_{c0}(1P)$ fixed to the PDG 2016 value.							avg. / def.
5) M056M	AAU 2017BB	u	3413.0 ± 1.9 ± 0.8 (MeV)	913	u	LHCB	$pp \rightarrow \bar{b}bX \rightarrow 2(K^+ K^-)X$	avg. / def. M056M M056
10 Linkage-A)	From a fit of the ϕ invariant mass with the width of $\chi_{c0}(1P)$ fixed to the PDG 2016 value.							avg. / def.
6) M057M	AAU 2017BB	u	3557.3 ± 1.7 ± 0.7 (MeV)	611	u	LHCB	$pp \rightarrow \bar{b}bX \rightarrow 2(K^+ K^-)X$	avg. / def. M057M M057
10 Linkage-A)	From a fit of the ϕ invariant mass with the width of $\chi_{c0}(1P)$ fixed to the PDG 2016 value.							avg. / def.
7) M059M	AAU 2017BB	u	3636.4 ± 1.1 ± 0.7 (MeV)	365	u	LHCB	$pp \rightarrow \bar{b}bX \rightarrow 2(K^+ K^-)X$	avg. / def. M059M M059
10 Linkage-C)	From a fit of the ϕ invariant mass with the width of $\eta_c(2S)$ fixed to the PDG 2016 value.							avg. / def.

Sign off M026, M055, M056, M057, M059. ... Return to Encoder

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


- 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 ($S = C = B = 0$)				STRANGE ($S = \pm 1, C = B = 0$)		CHARMED, STRANGE ($C = S = \pm 1$)		$c \bar{c}$ (including possibly non- $q \bar{q}$ states)		
$I(G(J^{PC}))$		$I(G(J^{PC}))$		$I(J^P)$		$I(J^P)$		$I(G(J^{PC}))$		
<ul style="list-style-type: none">π^\pmπ^0η$f_0(500)$aka σ; was $f_0(600)$$\rho(770)$$\omega(782)$$\eta'(958)$$f_0(980)$$a_0(980)$$\phi(1020)$$h_1(1170)$$b_1(1235)$$a_1(1260)$$f_2(1270)$$f_1(1285)$$\eta(1295)$$\pi(1300)$$a_2(1320)$$f_0(1370)$	<ul style="list-style-type: none">$\rho_3(1690)$$\rho(1700)$$a_2(1700)$$f_0(1710)$$\eta(1760)$$\pi(1800)$$f_2(1810)$$X(1835)$$X(1840)$$\phi_3(1850)$$\eta_2(1870)$$\pi_2(1880)$$\rho(1900)$$f_2(1910)$$a_0(1950)$$f_2(1950)$$\rho_3(1990)$$f_2(2010)$$f_0(2020)$$a_4(2040)$$f_4(2050)$$\pi_2(2100)$	<ul style="list-style-type: none">$1^-(0^-)$$1^-(0^+)$$0^+(0^+)$$0^+(0^{++})$$1^+(1^{--})$$0^-(1^{--})$$0^+(0^+)$$0^+(0^{++})$$1^-(0^{--})$$0^-(1^{--})$$0^+(0^+)$$1^-(0^{++})$$0^-(1^+)$$1^+(1^+)$$1^-(1^{++})$$0^+(2^{++})$$0^+(1^{++})$$1^-(4^{++})$$1^-(2^{++})$$0^+(0^{++})$	<ul style="list-style-type: none">$1^+(3^{--})$$1^+(1^{--})$$1^-(2^{++})$$0^+(0^{++})$$1^-(0^+)$$0^+(2^{++})$$?^?(0^+)$$?^?(?^{??})$$0^-(3^{--})$$0^+(2^{++})$$1^-(2^+)$$1^-(2^{++})$$0^+(2^{++})$$1^+(3^{--})$$0^+(2^{++})$$1^-(4^{++})$$0^+(4^{++})$$1^-(2^+)$$0^+(0^{++})$	<ul style="list-style-type: none">K^\pmK^0K_S^0K_L^0$K_0^*(700)$aka κ; was $K_0^*(800)$$K^*(892)$$K_1(1270)$$K_1(1400)$$K^*(1410)$$K_0^*(1430)$$K_2^*(1430)$$K(1460)$$K_2(1580)$$K(1630)$$K_1(1650)$$K^*(1680)$$K_2(1770)$$K_3^*(1780)$$K_2(1820)$$K(1830)$	<ul style="list-style-type: none">$1/2(0^-)$$1/2(0^-)$$1/2(0^-)$$1/2(0^-)$$1/2(0^+)$$1/2(1^-)$$1/2(1^+)$$1/2(1^+)$$1/2(1^-)$$1/2(2^+)$$1/2(0^-)$$1/2(2^-)$$1/2(?^?)$$1/2(1^+)$$1/2(1^-)$$1/2(2^-)$$1/2(3^-)$$1/2(2^-)$$1/2(0^-)$	<ul style="list-style-type: none">D_s^\pmD_s^\pm$D_{s0}^*(2317)^\pm$$D_{s1}(2460)^\pm$$D_{s1}(2536)^\pm$$D_{s2}^*(2573)$$D_{s1}^*(2700)^\pm$$D_{s1}^*(2860)^\pm$$D_{s3}^*(2860)^\pm$$D_{sJ}(3040)^\pm$	<p>BOTTOM ($B = \pm 1$)</p> <ul style="list-style-type: none">B^\pmB^0B^\pm / B^0 ADMIXTURE$B^\pm / B^0 / B_s^0 / b$-baryon ADMIXTUREV_{cb} and V_{ub} CKM Matrix ElementsB^*$B_1(5721)^+$$B_1(5721)^0$	<ul style="list-style-type: none">$0(0^-)$$0(?^?)$$0(0^+)$$0(1^+)$$0(1^+)$$0(2^+)$$0(1^-)$$0(1^-)$$0(3^-)$$0(?^?)$	<ul style="list-style-type: none">$\eta_c(1S)$$J/\psi(1S)$$\chi_{c0}(1P)$$\chi_{c1}(1P)$$h_c(1P)$$\chi_{c2}(1P)$$\eta_c(2S)$$\psi(2S)$$\psi(3770)$$\psi_2(3823)$was $\psi(3823)$, $X(3823)$$\chi_{c0}(3860)$$\chi_{c1}(3872)$aka $X(3872)$$Z_c(3900)$was $X(3900)$$X(3915)$was $\chi_{c0}(3915)$$\chi_{c2}(3930)$was $\chi_{c2}(2P)$$X(3940)$$\chi(4020)$	<ul style="list-style-type: none">$0^+(0^{--})$$0^-(1^{--})$$0^+(0^{++})$$0^+(1^{++})$$?^?(1^+)$$0^+(2^{++})$$0^+(0^+)$$0^-(1^{--})$$0^-(1^{--})$$0^-(2^{--})$$0^+(0^{++})$$0^+(1^{++})$$1^+(1^+)$$0^+(0$ or $2^{++})$$0^+(2^{++})$$?^?(?^{??})$$1^+(?^{--})$

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High-statistics study of the reaction $\gamma p \rightarrow p 2\pi^0$

CBELSA/TAPS Collaboration (V. Sokhoyan (Bonn U., HSKP) et al.) [Show all 65 authors](#)

Jul 9, 2015 - 28 pages

Eur.Phys.J. A51 (2015) no.8, 95
 Erratum: Eur.Phys.J. A51 (2015) no.12, 187 (2015-08-06)

DOI: [10.1140/epja/i2015-15187-7](#), [10.1140/epja/i2015-15095-x](#)
 e-Print: [arXiv:1507.02488 \[nucl-ex\]](#) | [PDF](#)
 Experiment: [BONN-ELSA-CRYSTAL-BARREL](#)

ion of $2\pi^0$ mesons off protons was studied with the Crystal Barrel/TAPS experiment at the electron in Bonn. The energy of photons produced in a radiator was tagged in the energy range from 600 MeV ential and total cross sections and $\pi\pi^0$ Dalitz plots are presented. Part of the data was taken with a producing linearly polarized photons, and beam asymmetries were derived. Properties of nucleon and tributing to the $\pi\pi^0$ final state were determined within the Bonn-Gatchina (BnGa) partial-wave a presented here allow us to determine branching ratios of nucleon and Δ resonances for their decays veral intermediate states. Most prominent are decays proceeding via $\Delta(1232)\pi$, $N(1440)1/2^+ \pi$, $(1680)5/2^+ \pi$, but also $p_0(500)$, $p_0(980)$, and $p_2(1270)$ contribute to the reaction.

[N\(1440\) pi](#) | [N\(1895\) -> N\(1440\) pi](#) | [More](#)

figures, 7 tables

RE: [photoproduction](#) | [Crystal Barrel](#) | [meson](#) | [p](#) | [photon: energy](#) | [total cross section](#) | [differential cross](#) | [nucleon: branching ratio](#) | [electron: accelerator](#) | [beam: asymmetry](#) | [polarized beam](#) | [baryon](#) | [oscillator](#) | [final state](#) | [partial wave analysis](#) | [intermediate state](#) | [bremsstrahlung](#) | [kinematics](#) | [background](#) | [momentum](#) | [mass spectrum](#) | [angular distribution](#) | [helicity](#) | [Auger](#) | [Bonn ELSA Stor](#) | [Delta\(1232\)](#) | [N\(1440\)](#) | [N\(1520\)](#) | [N\(1680\)](#) | [statistics](#) | [diamond](#) | [Mainz Linac](#) | [Frascati Stor](#) | [SAPHIR](#) | [experimental results](#) | [0.6-2.5 GeV](#)

$N(1440)$ POLE POSITION

REAL PART

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VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
1360 to 1380 (≈ 1370)	OUR ESTIMATE		
1369 ± 3	SOKHOYAN 2015A	DPWA	Multichannel
1363 $\pm 2 \pm 2$	¹ SVARC 2014	L+P	$\pi N \rightarrow \pi N$
1375 ± 30	CUTKOSKY 1980	IPWA	$\pi N \rightarrow \pi N$

... We do not use the following data for averages, fits, limits, etc ...

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S043 W	GURTU/GRUN	GURTU/GRUN	M.Barnett
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S066 ν	M.Goodman	C.Lin	C.Lin
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Amidei	Dan	amidei@umich.edu	verifier (2017)	Michigan U.
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Aprile	Elena	age@astro.columbia.edu	verifier (2017)	Columbia U.
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Bales	Matthew	matthew.bales@tum.de	verifier (2017)	Munchen Tech. U.
Bales	Matthew	matthew.bales@tum.de	verifier (2017)	Munchen Tech. U.
Barranco	Juan	jbarranc@fis.cinvestav.mx	verifier (2017)	Guanajuato U.
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Bernabei	Rita	rita.bernabei@roma2.infn.it	verifier (2017)	Rome U. Tor Vergata
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


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DESIGNATOR <i>k</i>	<input type="checkbox"/>	INTEGER		Distinguishes one partial decay mode from another for a single particle. Distinguishes one partial decay mode from another for a single particle. The DESIGNATOR can be used in text such as branching ratio headers to call in REACTION from this table for dynamic replacement. Between 1 and 300.	
CLUMP	<input type="checkbox"/>	VARCHAR	1	The type of decay mode. The partial decay modes will be grouped by CLUMP. See RPP_TEXT.CLUMP The type of decay mode. See CLUMP in the RPP_TEXT table. When NULL, the decay mode will print directly under a heading like `` $a_0(1200)$ PARTIAL DECAY MODES''. The remaining decay modes can be printed in clumps under a user-supplied header such as ``Radiative Decays'' or ``Non-Radiative Decays'' and text. The clumps will be sorted by CLUMP.	
SORT /	<input type="checkbox"/>	INTEGER		Determines the order in which a particle's partial decay modes will be renumbered and printed. Decay modes are ordered so that all particles sharing a common decay modes will be renumbered. At print time, the partial decay modes will be listed with designator numbers starting at 1 and incrementing by one and all references to the list of decay modes (branching ratio headers and fit correlation matrices) will be	

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