NODE=M156

$f_0(2020)$

$I^G(J^{PC}) = 0^+(0^{++})$

Needs confirmation.

NODE=M156

$f_0(2020)$ T-MATRIX POLE $\sqrt{s}$

NODE=M156PP

Note that $\Gamma = -2\ \mathrm{Im}(\sqrt{s})$.

NODE=M156PP

NODE=M156PP

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
(1870–2080) − *i* (120–240) OUR ESTIMATE				
$(2141.9 \pm 17.2 \pm 17.9) - i\,(138.8 \pm 10.0 \pm 14.4)$	ABLIKIM	25CD	BES3	$e^+ e^- \rightarrow \psi(2S)$
$(2038 \pm 48) - i\,(156 \pm 41)$	[1] RODAS	22	RVUE	$J/\psi(1S) \rightarrow \gamma\,(\pi\pi,\ K\overline{K})$
$(1925 \pm 25) - i\,(160 \pm 18)$	SARANTSEV	21	RVUE	$J/\psi(1S) \rightarrow \gamma\,(\pi\pi,\ K\overline{K},\ \eta\eta,\ \omega\phi)$
$(1910 \pm 50) - i\,(199 \pm 40)$	[2] ROPERTZ	18	RVUE	$\overline{B}{}^0_s \rightarrow J/\psi(\pi^+\pi^-/K^+K^-)$
$(1992 \pm 16) - i\,(221 \pm 30)$	[3] BARBERIS	00C		$450\ pp \rightarrow p_f\, 4\pi\, p_s$
$(2020 \pm 35) - i\,(205 \pm 25)$	BARBERIS	97B	OMEG	$450\ pp \rightarrow pp2(\pi^+\pi^-)$

→ UNCHECKED ←

[1] T-matrix pole from coupled channel K-matrix fit to data on $J/\psi \rightarrow \gamma\pi^0\pi^0$ (ABLIKIM 15AE) and $J/\psi \rightarrow \gamma K^0_S K^0_S$ (ABLIKIM 18AA).

NODE=M156PP;LINKAGE=A

[2] T-matrix pole of 3 channel unitary model fit to data from AAIJ 14BR and AAIJ 17V extracted using Pade approximants.

NODE=M156PP;LINKAGE=C

[3] Average between $\pi^+\pi^- 2\pi^0$ and $2(\pi^+\pi^-)$.

NODE=M156PP;LINKAGE=B

$f_0(2020)$ MASS

NODE=M156M

NODE=M156M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{1982 \pm 3^{+54}_{-0}}$		[1] ABLIKIM	22C	BES3	$J/\psi \rightarrow \gamma\eta'\eta' \rightarrow 4/5\gamma 2(\pi^+\pi^-)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$2010 \pm 6^{+6}_{-4}$		[2] ABLIKIM	22AS	BES3	$J/\psi(1S) \rightarrow \gamma\eta\eta'$
2037 ± 8	80k	[3] UMAN	06	E835	$5.2\ \overline{p}p \rightarrow \eta\eta\pi^0$
2040 ± 38		ANISOVICH	00J	SPEC	
2010 ± 60		ALDE	98	GAM4	$100\ \pi^- p \rightarrow \pi^0\pi^0 n$

[1] From a partial wave analysis of the systems (γX), with $X \rightarrow \eta'\eta'$, and $(\eta' X)$, with $X \rightarrow \gamma\eta'$ in the decay $J/\psi \rightarrow \gamma\eta'\eta'$. The intermediate resonance X is parametrized by a constant-width, relativistic Breit-Wigner.

NODE=M156M;LINKAGE=C

[2] From a Breit-Wigner fit involving 9 resonances and a resonating exotic $\eta_1(1855) \rightarrow \eta\eta'$ P-wave.

NODE=M156M;LINKAGE=D

[3] Statistical error only.

NODE=M156M;LINKAGE=ST

$f_0(2020)$ WIDTH

NODE=M156W

NODE=M156W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{436 \pm 4^{+46}_{-49}}$		[1] ABLIKIM	22C	BES3	$J/\psi \rightarrow \gamma\eta'\eta' \rightarrow 4/5\gamma 2(\pi^+\pi^-)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$203 \pm 9^{+13}_{-11}$		[2] ABLIKIM	22AS	BES3	$J/\psi(1S) \rightarrow \gamma\eta\eta'$
296 ± 17	80k	[3] UMAN	06	E835	$5.2\ \overline{p}p \rightarrow \eta\eta\pi^0$
405 ± 40		ANISOVICH	00J	SPEC	
240 ± 100		ALDE	98	GAM4	$100\ \pi^- p \rightarrow \pi^0\pi^0 n$

[1] From a partial wave analysis of the systems (γX), with $X \rightarrow \eta'\eta'$, and $(\eta' X)$, with $X \rightarrow \gamma\eta'$ in the decay $J/\psi \rightarrow \gamma\eta'\eta'$. The intermediate resonance X is parametrized by a constant-width, relativistic Breit-Wigner.

NODE=M156W;LINKAGE=C

[2] From a Breit-Wigner fit involving 9 resonances and a resonating exotic $\eta_1(1855) \rightarrow \eta\eta'$ P-wave.

NODE=M156W;LINKAGE=D

[3] Statistical error only.

NODE=M156W;LINKAGE=ST

$f_0(2020)$ DECAY MODES

NODE=M156215;NODE=M156

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\rho\pi\pi$	seen	DESIG=1;OUR EST;→ UNCHECKED ←
Γ_2	$\pi^0\pi^0$	seen	DESIG=2;OUR EST;→ UNCHECKED ←
Γ_3	$\rho\rho$	seen	DESIG=3;OUR EST;→ UNCHECKED ←
Γ_4	$\omega\omega$	seen	DESIG=4;OUR EST;→ UNCHECKED ←
Γ_5	$\eta\eta$	seen	DESIG=5
Γ_6	$\eta'\eta'$	seen	DESIG=6

$f_0(2020)$ BRANCHING RATIOS

NODE=M156220

$\Gamma(\rho\rho)/\Gamma(\omega\omega)$ — Γ_3/Γ_4

NODE=M156R1
NODE=M156R1

VALUE	DOCUMENT ID		COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
~ 3	BARBERIS	00F	450 $pp \to p_f \omega\omega p_s$

$\Gamma(\eta\eta)/\Gamma_{total}$ — Γ_5/Γ

NODE=M156R01
NODE=M156R01

VALUE	DOCUMENT ID		TECN	COMMENT
seen	UMAN	06	E835	5.2 $\overline{p}p \to \eta\eta\pi^0$

$\Gamma(\eta'\eta')/\Gamma_{total}$ — Γ_6/Γ

NODE=M156R00
NODE=M156R00

VALUE	DOCUMENT ID		TECN	COMMENT
seen	[1] ABLIKIM	22C	BES3	$J/\psi \to \gamma\eta'\eta' \to 4/5\gamma 2(\pi^+\pi^-)$

[1] From a partial wave analysis of the systems (γX), with $X \to \eta'\eta'$, and ($\eta' X$), with $X \to \gamma\eta'$ in the decay $J/\psi \to \gamma\eta'\eta'$. The intermediate resonance X is parametrized by a constant-width, relativistic Breit-Wigner.

NODE=M156R00;LINKAGE=A

$f_0(2020)$ REFERENCES

NODE=M156

ABLIKIM	25CD	JHEP 2510 081	M. Ablikim *et al.*	(BESIII Collab.)	REFID=63625
ABLIKIM	22AS	PR D106 072012	M. Ablikim *et al.*	(BESIII Collab.)	REFID=61891
Also		PR D107 079901 (errat.)	M. Ablikim *et al.*	(BESIII Collab.)	REFID=62033
ABLIKIM	22C	PR D105 072002	M. Ablikim *et al.*	(BESIII Collab.)	REFID=61637
RODAS	22	EPJ C82 80	A. Rodas *et al.*	(JPAC Collab.)	REFID=61610
SARANTSEV	21	PL B816 136227	A.V. Sarantsev *et al.*	(BONN, PNPI)	REFID=61091
ABLIKIM	18AA	PR D98 072003	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59455
ROPERTZ	18	EPJ C78 1000	S. Ropertz, C. Hanhart, B. Kubis	(BONN, JULI)	REFID=59332
AAIJ	17V	JHEP 1708 037	R. Aaij *et al.*	(LHCb Collab.)	REFID=57828
ABLIKIM	15AE	PR D92 052003	M. Ablikim *et al.*	(BESIII Collab.)	REFID=56984
AAIJ	14BR	PR D89 092006	R. Aaij *et al.*	(LHCb Collab.)	REFID=56035
UMAN	06	PR D73 052009	I. Uman *et al.*	(FNAL E835)	REFID=51063
ANISOVICH	00J	PL B491 47	A.V. Anisovich *et al.*	(RAL, LOQM, PNPI+)	REFID=47950
BARBERIS	00C	PL B471 440	D. Barberis *et al.*	(WA 102 Collab.)	REFID=47959
BARBERIS	00F	PL B484 198	D. Barberis *et al.*	(WA 102 Collab.)	REFID=47962
ALDE	98	EPJ A3 361	D. Alde *et al.*	(GAM4 Collab.)	REFID=46605
Also		PAN 62 405 Translated from YAF 62 446.	D. Alde *et al.*	(GAMS Collab.)	REFID=46914
BARBERIS	97B	PL B413 217	D. Barberis *et al.*	(WA 102 Collab.)	REFID=45758