$\Upsilon(11020)$

$I^G(J^{PC}) = 0^-(1^{--})$

$\Upsilon(11020)$ MASS

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
$10987.5^{+\ 6.4+9.1}_{-\ 2.5-2.3$	[1] SANTEL	16	BELL	$e^+e^- \to \Upsilon(1S,2S,3S)\pi^+\pi^-$

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

$11003.0 \pm 1.1^{+0.9}_{-1.0}$	[2,3] SANTEL	16	BELL	e^+e^-	→ hadrons
10996 ± 2	[4] AUBERT	09E	BABR	e^+e^-	→ hadrons
11019 ± 5 ±7	BESSON	85	CLEO	e^+e^-	→ hadrons
11020 ±30	LOVELOCK	85	CUSB	e^+e^-	→ hadrons

[1] From a simultaneous fit to the $\Upsilon(nS)\pi^+\pi^-$, $n = 1$, 2, 3 cross sections at 25 energy points within $\sqrt{s}$ = 10.6–11.05 GeV to a pair of interfering Breit-Wigner amplitudes modified by phase space factors, with fourteen resonance parameters (a mass, width, and three amplitudes for each of $\Upsilon(10860)$ and $\Upsilon(11020)$, a single universal relative phase, and three decoherence coefficients, one for each n). Continuum contributions were measured (and therefore fixed) to be zero.

[2] From a fit to the total hadronic cross sections measured at 60 energy points within $\sqrt{s}$ = 10.82–11.05 GeV to a pair of interfering Breit-Wigner amplitudes and two floating continuum amplitudes with $1/\sqrt{s}$ dependence, one coherent with the resonances and one incoherent, with six resonance parameters (a mass, width, and an amplitude for each of $\Upsilon(10860)$ and $\Upsilon(11020)$, one relative phase, and one decoherence coefficient).

[3] Not including uncertain and potentially large systematic errors due to assumed continuum amplitude $1/\sqrt{s}$ dependence and related interference contributions.

[4] In a model where a flat non-resonant $b\overline{b}$-continuum is incoherently added to a second flat component interfering with two Breit-Wigner resonances. Systematic uncertainties not estimated.

$\Upsilon(11020)$ WIDTH

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
$61\ ^{+\ 9}_{-19}\ ^{+\ 2}_{-20}$	[5] SANTEL	16	BELL	$e^+e^- \to \Upsilon(1S,2S,3S)\pi^+\pi^-$

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

$39.3^{+\ 1.7+\ 1.3}_{-\ 1.6-\ 2.4}$	[6,7] SANTEL	16	BELL	e^+e^-	→ hadrons
37 ± 3	[8] AUBERT	09E	BABR	e^+e^-	→ hadrons
61 ±13 ±22	BESSON	85	CLEO	e^+e^-	→ hadrons
90 ±20	LOVELOCK	85	CUSB	e^+e^-	→ hadrons

[5] From a simultaneous fit to the $\Upsilon(nS)\pi^+\pi^-$, n=1, 2, 3 cross sections at 25 energy points within $\sqrt{s}$ = 10.6–11.05 GeV to a pair of interfering Breit-Wigner amplitudes modified by phase space factors, with fourteen resonance parameters (a mass, width, and three amplitudes for each of $\Upsilon(10860)$ and $\Upsilon(11020)$, a single universal relative phase, and three decoherence coefficients, one for each n). Continuum contributions were measured (and therefore fixed) to be zero.

[6] From a fit to the total hadronic cross sections measured at 60 energy points within $\sqrt{s}$ = 10.82–11.05 GeV to a pair of interfering Breit-Wigner amplitudes and two floating continuum amplitudes with $1/\sqrt{s}$ dependence, one coherent with the resonances and one incoherent, with six resonance parameters (a mass, width, and an amplitude for each of $\Upsilon(10860)$ and $\Upsilon(11020)$, one relative phase, and one decoherence coefficient).

[7] Not including uncertain and potentially large systematic errors due to assumed continuum amplitude $1/\sqrt{s}$ dependence and related interference contributions.

[8] In a model where a flat non-resonant $b\overline{b}$-continuum is incoherently added to a second flat component interfering with two Breit-Wigner resonances. Systematic uncertainties not estimated.

$\Upsilon(11020)$ DECAY MODES

	Mode	Fraction (Γ_i/Γ)
Γ_1	$e^+ e^-$	$(2.1^{+1.1}_{-0.6}) \times 10^{-6}$

$\Upsilon(11020)$ PARTIAL WIDTHS

$\Gamma(e^+e^-)$ Γ_1

VALUE (keV)	*DOCUMENT ID*		*TECN*	*COMMENT*
0.130±0.030 OUR AVERAGE				
0.095±0.03 ±0.035	BESSON	85	CLEO	$e^+e^- \rightarrow$ hadrons
0.156±0.040	LOVELOCK	85	CUSB	$e^+e^- \rightarrow$ hadrons

$\Upsilon(11020)$ REFERENCES

SANTEL	16	PR D93 011101	D. Santel *et al.*	(BELLE Collab.)
AUBERT	09E	PRL 102 012001	B. Aubert *et al.*	(BABAR Collab.)
BESSON	85	PRL 54 381	D. Besson *et al.*	(CLEO Collab.)
LOVELOCK	85	PRL 54 377	D.M.J. Lovelock *et al.*	(CUSB Collab.)