

Supplemental Material for “Precise measurement of the  $e^+e^- \rightarrow D_s^{*+}D_s^{*-}$  cross sections at center-of-mass energies from threshold to 4.95 GeV”

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185 The measured Born cross sections of  $e^+e^- \rightarrow D_s^{*+}D_s^{*-}$  are summarized in Table I and Table II. A covariance error  
 186 matrix which includes the correlations between the uncertainties at different scan points is provided in the other  
 187 Supplementary Material [1].

TABLE I. The center-of-mass energies ( $E_{\text{CM}}$ ) [2–4], the integrated luminosities ( $\mathcal{L}_{\text{int}}$ ) [4–6], the initial radiative correction factors ( $1 + \delta^{\text{ISR}}$ ), the efficiencies ( $\epsilon_{\text{ST}}$ ), the numbers of  $D_s^{*+}D_s^{*-}$  ( $N_{D_s^{*+}D_s^{*-}}$ ), the vacuum polarization factors ( $\frac{1}{|1-\Pi|^2}$ ) and the measured Born cross sections of  $e^+e^- \rightarrow D_s^{*+}D_s^{*-}$  ( $\sigma_{\text{Born}}$ ) at the 76 energy points. The first uncertainties are statistical and the second ones systematic.

$E_{\text{CM}}$ (GeV)	$\mathcal{L}_{\text{int}}$ (pb $^{-1}$ )	$1 + \delta^{\text{ISR}}$	$\epsilon_{\text{ST}}$	$N_{D_s^{*+}D_s^{*-}}$	$\frac{1}{ 1-\Pi ^2}$	$\sigma_{\text{Born}}$ (pb)
4.22626	1100.94	0.780	0.2836±0.0012	917±37	1.06	32.7±1.4±8.4
4.228	8.193	0.525	0.2759±0.0015	11.4±4.1	1.06	84±17±18
4.233	8.273	0.580	0.2774±0.0015	41.6±6.9	1.06	272±28±33
4.2357	530.3	0.646	0.2854±0.0015	3622±64	1.06	321.9±8.0±25
4.238	7.83	0.659	0.2778±0.0015	62.7±8.6	1.06	381±37±30
4.241	8.571	0.672	0.2773±0.0015	88±10	1.06	479±41±31
4.24166	55.88	0.675	0.2857±0.0015	593±26	1.06	478±18±31
4.243	8.487	0.682	0.2780±0.0015	75.6±9.7	1.06	408±39±26
4.2438	538.1	0.684	0.2818±0.0015	5996±83	1.06	503±13±32
4.246	8.554	0.694	0.2727±0.0015	87±10	1.06	468±41±30
4.248	8.596	0.701	0.2727±0.0015	112±11	1.06	594±46±38
4.253	8.657	0.720	0.2712±0.0014	84±11	1.05	434±44±28
4.25797	828.4	0.736	0.2717±0.0014	10534±117	1.05	554±14±35
4.258	8.88	0.736	0.2639±0.0014	95±11	1.05	480±46±31
4.263	8.629	0.752	0.2570±0.0014	106±13	1.05	553±55±35
4.2668	531.1	0.764	0.2637±0.0014	6592±134	1.05	537±16±34
4.268	8.548	0.769	0.2548±0.0014	95±19	1.05	496±83±32
4.273	8.567	0.785	0.2497±0.0014	88±18	1.05	455±77±29
4.2777	175.7	0.802	0.2475±0.0014	1887±56	1.05	472±17±30
4.278	8.723	0.803	0.2477±0.0014	92±12	1.05	462±52±30
4.283	8.596	0.822	0.2371±0.0013	80±11	1.05	417±53±27
4.28788	502.4	0.840	0.2410±0.0013	4678±88	1.05	401±13±26
4.288	9.01	0.841	0.2346±0.0013	107±13	1.05	524±57±34
4.298	8.453	0.889	0.2272±0.0013	74±11	1.05	380±54±24
4.30789	45.08	0.955	0.2246±0.0012	255±23	1.05	231±22±22
4.308	8.599	0.955	0.2167±0.0012	37.0±9.0	1.05	182±45±17
4.31205	501.2	0.988	0.2112±0.0012	2301±71	1.05	191.8±8.8±18
4.318	9.342	1.056	0.1989±0.0011	11.7±7.6	1.05	51.8±38±5.0
4.328	8.657	1.230	0.1740±0.0010	18.3±8.3	1.05	86.1±51±8.3
4.33739	505	1.548	0.1481±0.0008	545±54	1.05	41.1±6.9±3.9
4.338	8.7	1.567	0.1424±0.0008	6.4±6.5	1.05	28.9±48±2.8
4.348	8.542	2.191	0.1042±0.0006	12.9±7.6	1.05	57.7±78±5.5
4.358	8.063	2.283	0.0921±0.0006	11.4±7.1	1.05	58.7±88±5.6
4.35826	543.9	2.298	0.0938±0.0006	297±53	1.05	22.1±9.7±2.1
4.368	8.498	1.455	0.1269±0.0008	9.8±7.2	1.05	54.5±61±5.2
4.37737	522.7	1.037	0.1787±0.0011	847±63	1.05	76.3±6.7±7.3
4.378	8.158	1.021	0.1764±0.0011	4.3±6.9	1.05	25.5±44±2.4
4.3874	55.57	0.872	0.2144±0.0013	157±22	1.05	132±18±13
4.388	7.46	0.864	0.2083±0.0013	27.5±8.3	1.05	179±49±17
4.393	7.43	0.828	0.2217±0.0013	28.9±8.6	1.05	185±48±18
4.39645	507.8	0.814	0.2347±0.0014	1983±74	1.05	178.5±7.5±17
4.398	7.178	0.806	0.2285±0.0014	33.9±8.8	1.05	224±50±21
4.408	6.352	0.789	0.2408±0.0014	32.5±9.8	1.05	235±59±15
4.41558	1090.7	0.785	0.2485±0.0014	7362±126	1.05	301.7±9.0±19
4.418	7.519	0.787	0.2458±0.0014	66±11	1.05	399±55±26
4.423	7.436	0.790	0.2419±0.0014	47±10	1.05	287±53±18
4.428	6.788	0.797	0.2429±0.0014	50±11	1.05	329±59±21
4.43624	569.9	0.810	0.2443±0.0014	4735±99	1.05	365±12±23
4.438	7.634	0.813	0.2400±0.0014	72±12	1.05	418±61±27
4.448	7.677	0.834	0.2375±0.0014	60±11	1.05	342±54±22
4.458	8.724	0.859	0.2350±0.0014	65±11	1.05	319±52±20

TABLE II. The center-of-mass energies ( $E_{\text{CM}}$ ) [2–4], the integrated luminosities ( $\mathcal{L}_{\text{int}}$ ) [4–6], the initial radiative correction factors ( $1 + \delta^{\text{ISR}}$ ), the efficiencies ( $\epsilon_{\text{ST}}$ ), the numbers of  $D_s^{*+}D_s^{*-}$  ( $N_{D_s^{*+}D_s^{*-}}$ ), the vacuum polarization factors ( $\frac{1}{|1-\Pi|^2}$ ) and the measured Born cross sections of  $e^+e^- \rightarrow D_s^{*+}D_s^{*-}$  ( $\sigma_{\text{Born}}$ ) at the 76 energy points. The first uncertainties are statistical and the second ones systematic. (continued)

$E_{\text{CM}}$ (GeV)	$\mathcal{L}_{\text{int}}$ ( $\text{pb}^{-1}$ )	$1 + \delta^{\text{ISR}}$	$\epsilon_{\text{ST}}$	$N_{D_s^{*+}D_s^{*-}}$	$\frac{1}{ 1-\Pi ^2}$	$\sigma_{\text{Born}}$ (pb)
4.46706	111.09	0.882	0.2324±0.0013	745±39	1.05	285±16±18
4.478	8.167	0.911	0.2239±0.0013	25.6±8.5	1.05	133.4±43±8.5
4.498	7.997	0.961	0.2064±0.0012	33.3±9.4	1.05	183±53±12
4.518	8.674	0.998	0.2007±0.0012	18.8±8.8	1.05	94.2±47±6.0
4.52714	112.12	1.015	0.2003±0.0012	326±31	1.05	124.3±13±8.0
4.538	9.335	1.026	0.1941±0.0012	34.4±8.9	1.05	161.2±46±10
4.548	8.765	1.032	0.1924±0.0012	31±8.6	1.05	154.9±47±9.9
4.558	8.259	1.031	0.1937±0.0012	22.4±8.2	1.05	118.0±47±7.6
4.568	8.39	1.031	0.1895±0.0012	30.6±8.4	1.05	162.3±49±10
4.5745	48.93	1.028	0.1983±0.0012	143±20	1.05	124.8±19±8.0
4.578	8.545	1.027	0.1900±0.0012	20.2±7.4	1.05	105.3±42±6.7
4.588	8.162	1.019	0.1904±0.0012	25.8±8.4	1.05	141.6±50±9.1
4.59953	586.9	1.014	0.1986±0.0012	1842±70	1.05	135.5±7.2±8.7
4.61186	103.83	1.005	0.1995±0.0012	308±29	1.05	128.9±13±8.3
4.628	521.52	0.991	0.1997±0.0006	1481±63	1.05	124.8±6.9±8.0
4.64091	552.41	0.984	0.2027±0.0006	1414±63	1.05	111.8±6.3±7.2
4.66124	529.63	0.972	0.2045±0.0012	1408±61	1.05	116.4±6.4±7.5
4.68192	1669.31	0.961	0.2099±0.0006	4939±111	1.05	127.7±5.0±8.2
4.69882	536.45	0.956	0.2055±0.0013	1746±65	1.05	144.4±7.2±9.2
4.7397	164.27	0.945	0.2133±0.0006	547±35	1.05	144.2±10±9.2
4.75005	367.21	0.943	0.2148±0.0013	1238±53	1.05	145.0±7.7±9.3
4.78054	512.78	1.018	0.2044±0.0012	1413±58	1.06	115.4±6.4±7.4
4.84307	527.29	0.996	0.1932±0.0012	1049±51	1.06	90.2±5.5±7.1
4.91802	208.11	0.992	0.2018±0.0012	516±32	1.06	107.8±7.9±6.9
4.95093	160.37	1.006	0.1984±0.0012	323±26	1.06	88.3±8.2±5.7

188 The other fitting parameters of the dressed cross sections are summarized in Table III.

TABLE III. The other fitting parameters of the dressed cross sections

	Result 1	Result 2	Result 3
$a_1$ (MeV)	4.3±2.1	2.74±0.94	2.85±0.87
$(\Gamma_{e^+e^-}B(D_s^*D_s^*))_2$ (eV)	74.6 ± 7.3	46.0 ± 6.1	123 ± 14
$\phi_2$ (rad)	-1.29±0.12	-0.981±0.068	-2.244±0.070
$(\Gamma_{e^+e^-}B(D_s^*D_s^*))_3$ (eV)	6 ± 22	1.3 ± 2.8	1.13 ± 0.48
$\phi_3$ (rad)	1.15±0.58	0.96±0.89	-1.07±0.45
$n$	9.73±0.18	9.270±0.044	9.301±0.045
$a_0$ ( $\times 10^4$ GeV $^{n-1}$ )	7.1 ± 2.3	3.16 ± 0.54	3.2 ± 1.8
$\phi_0$ (rad)	2.959±0.043	3.087±0.022	2.675±0.029

- 189 [1] Supplemental Material 2 [link to be added].  
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