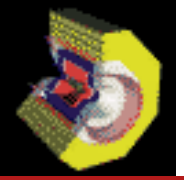

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$D_S^{*+} \to D_S^+ e^+ e^-$

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Contents

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Cut Optimization

•With cuts settled, we unblinded the sideband region of the ΔΦ, defined by

signal region < ΔΦ < π/2

to make sure we see the number of conversion events we expect. Here's what we see:

Mode	signal region < ΔΦ < pi/2							
	signal MC	conver MC D_s^+	conver MC D_s^-	generic MC - conver	continu MC	sum MC	data	$\frac{\text{data}}{\text{MC}}$
$K^+K^-\pi^+$	4.4 ± 0.21	4 ± 0.52	4.2 ± 0.47	0.5 ± 0.16	0.2 ± 0.2	8.9 ± 0.75	9 ± 3	1 ± 0.35
K_SK^+	0.73 ± 0.04	0.41 ± 0.17	0.68 ± 0.19	0.25 ± 0.11	0 ± 0	1.3 ± 0.28	3 ± 1.7	2.2 ± 1.4
$\eta\pi^+$	1.3 ± 0.06	0.48 ± 0.18	0.31 ± 0.13	0 ± 0	0.4 ± 0.28	1.2 ± 0.36	2 ± 1.4	1.7 ± 1.3
$\eta'\pi^+$	0.39 ± 0.02	0.48 ± 0.18	0.21 ± 0.1	0.05 ± 0.05	0.2 ± 0.2	0.94 ± 0.29	3 ± 1.7	3.2 ± 2.1
$K^+K^-\pi^+\pi^0$	1.6 ± 0.1	1.5 ± 0.32	1 ± 0.23	1.3 ± 0.25	0.2 ± 0.2	4 ± 0.51	9 ± 3	2.2 ± 0.79
$\pi^+\pi^-\pi^+$	1.1 ± 0.05	1.4 ± 0.31	1.4 ± 0.27	0.25 ± 0.11	1.8 ± 0.6	4.8 ± 0.74	8 ± 2.8	1.7 ± 0.64
$K^{*+}K^{*0}$	0.6 ± 0.04	0.48 ± 0.18	0.63 ± 0.18	0.4 ± 0.14	0 ± 0	1.5 ± 0.29	0 ± 0	0 ± nan
$\eta\rho^+$	1.3 ± 0.11	1.2 ± 0.28	1.3 ± 0.26	0.5 ± 0.16	1.2 ± 0.49	4.2 ± 0.64	4 ± 2	0.96 ± 0.5
$\eta'\pi^+$	0.78 ± 0.04	0.89 ± 0.25	1 ± 0.23	0.45 ± 0.15	2 ± 0.63	4.4 ± 0.73	1 ± 1	0.23 ± 0.23
Total	12.2 ± 0.3	10.8 ± 0.9	10.7 ± 0.8	3.7 ± 0.4	6 ± 1.1	43.5 ± 1.7	39 ± 6.2	0.90 ± 0.15

mBC sidebands

- We re-computed the sideband table for the m_BC variable.

Mode	m_{BC} < signal region							m_{BC} > signal region						
	conver MC D_s^+	conver MC D_s^-	generic MC - conver	contim MC	sum MC	data	$\frac{data}{MC}$	conver MC D_s^+	conver MC D_s^-	generic MC - conver	contim MC	sum MC	data	$\frac{data}{MC}$
$K^+K^-\pi^+$	0.68 ± 0.22	1.2 ± 0.25	2.2 ± 0.33	1.4 ± 0.53	5.5 ± 0.71	11 ± 3.3	2 ± 0.66	1.4 ± 0.31	1.1 ± 0.24	1.5 ± 0.27	0 ± 0	4.1 ± 0.48	4 ± 2	0.98 ± 0.5
K_sK^+	0.21 ± 0.12	0.26 ± 0.12	0.35 ± 0.13	0.4 ± 0.28	1.2 ± 0.35	4 ± 2	3.3 ± 1.9	0.14 ± 0.097	0.57 ± 0.17	0.2 ± 0.1	0 ± 0	0.91 ± 0.22	2 ± 1.4	2.2 ± 1.6
$\eta\pi^+$	0 ± 0	0.31 ± 0.13	0.25 ± 0.11	3.8 ± 0.87	4.4 ± 0.89	5 ± 2.2	1.1 ± 0.56	0.21 ± 0.12	0.16 ± 0.09	0 ± 0	0.8 ± 0.4	1.2 ± 0.43	2 ± 1.4	1.7 ± 1.4
$\eta'\pi^+$	0.27 ± 0.14	0.1 ± 0.074	0.2 ± 0.1	0 ± 0	0.58 ± 0.18	0 ± 0	0 ± nan	0.068 ± 0.068	0.052 ± 0.052	0.05 ± 0.05	0 ± 0	0.17 ± 0.1	0 ± 0	0 ± nan
$K^+K^-\pi^+\pi^0$	0.82 ± 0.24	0.68 ± 0.19	16 ± 0.88	3.6 ± 0.85	21 ± 1.3	21 ± 4.6	1 ± 0.23	1.2 ± 0.28	0.78 ± 0.2	7.7 ± 0.62	1.2 ± 0.49	11 ± 0.86	9 ± 3	0.83 ± 0.29
$\pi^+\pi^-\pi^+$	0.27 ± 0.14	0.16 ± 0.09	2 ± 0.32	8.2 ± 1.3	11 ± 1.3	11 ± 3.3	1 ± 0.34	0.82 ± 0.24	0.47 ± 0.16	0.95 ± 0.22	5.6 ± 1.1	7.8 ± 1.1	9 ± 3	1.1 ± 0.42
$K^{*+}K^{*0}$	0.41 ± 0.17	0.31 ± 0.13	5.7 ± 0.53	0.6 ± 0.35	7 ± 0.67	17 ± 4.1	2.4 ± 0.63	0.89 ± 0.25	0.47 ± 0.16	2.3 ± 0.34	0.4 ± 0.28	4.1 ± 0.53	1 ± 1	0.25 ± 0.25
$\eta\rho^+$	0.89 ± 0.25	0.68 ± 0.19	5.6 ± 0.53	17 ± 1.8	24 ± 1.9	26 ± 5.1	1.1 ± 0.23	1.1 ± 0.27	1.4 ± 0.27	3.3 ± 0.41	10 ± 1.4	16 ± 1.5	14 ± 3.7	0.89 ± 0.25
$\eta'\pi^+$	0.55 ± 0.19	0.53 ± 0.18	2.9 ± 0.38	12 ± 1.5	16 ± 1.6	15 ± 3.9	0.95 ± 0.26	0.41 ± 0.17	0.31 ± 0.13	1.9 ± 0.3	6.2 ± 1.1	8.8 ± 1.2	3 ± 1.7	0.34 ± 0.2
Total	4.1	4.33	35.2	47	90.68	110	1.2					54.08	44	0.81

- Maybe I should put the signal prediction for this region in?

Prediction for Data for Sample Set of Cuts

Decay Mode of the D_S^+	Expected Signal Events in 586 pb^{-1} in the *Pion-Fitted* Samples	Expected Background Events in 586 pb^{-1} in *the Pion-Fitted* Samples	Expected Signal Events in 586 pb^{-1} in the *Electron-Fitted* Samples	Expected Background Events in 586 pb^{-1} in the *Electron-Fitted* Samples	Details in Link
$K^+K^-\pi^+$	12.3	2.0	14.1	1.1	KKpi
K_sK^+	3.3	0.8	3.2	0.5	KsK
$\pi^+\eta;\ \eta\to\gamma\gamma$	4.2	0.4	4.8	0.5	pieta
$\pi^+\acute{\eta};\ \acute{\eta}\to\pi^+\pi^-\eta;$ $\eta\to\gamma\gamma$	1.1	0.5	1.2	0.0	pietaprime
$K^+K^-\pi^+\pi^0$	4.9	3.8	5.1	2.2	KKpipi0
$\pi^+\pi^-\pi^+$	3.2	1.3	3.9	2.1	pipipi
$K^{*+}K^{*0};$ $K^{*+}\to K^0_S\pi^+;$ $K^{*0}\to K^-\pi^+$	1.9	1.3	2.1	1.0	KsKmpipi
$\eta\rho^+;\ \eta\to\gamma\gamma;$ $\rho^+\to\pi^+\pi^0$	5.8	5.9	6.0	2.5	pipi0eta
$\acute{\eta}\pi^+;\ \acute{\eta}\to\rho^0\gamma$	2.3	2.4	2.5	2.3	pietaprimerho
Total	**39.0**	**18.4**	**42.9**	**12.2**	

$$9.1\sigma \to 12.3\sigma$$