Scrutiny Process Activities -- Status Report

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Selection and optimisation of cuts

Preselection

→ *3σ mass window cuts*

Further cuts, optimised

- χ^2 *(4Cfit)*
- PID probabilities *(positive K, π, e PID, and π vetos)*
- Maximum p_t *(in event)*

Automatic optimisation procedure (validated)

- Genetic algorithm to find optimal cut values
- Tried different minimisations, namely for:

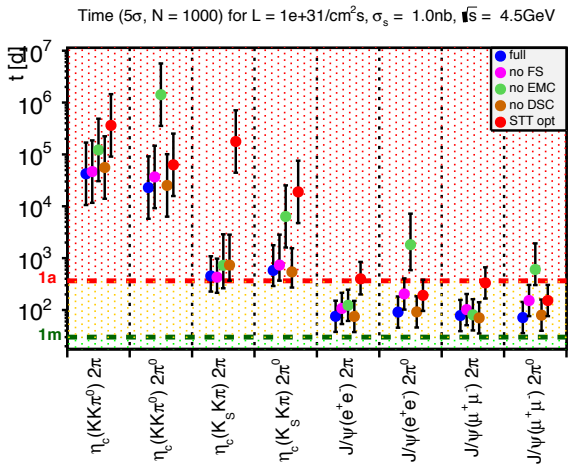
a) time t
b) t / ε_s
c) t / (S/B)
d) $t / (S/B * \varepsilon_s)$ → *turned out to be most suitable*

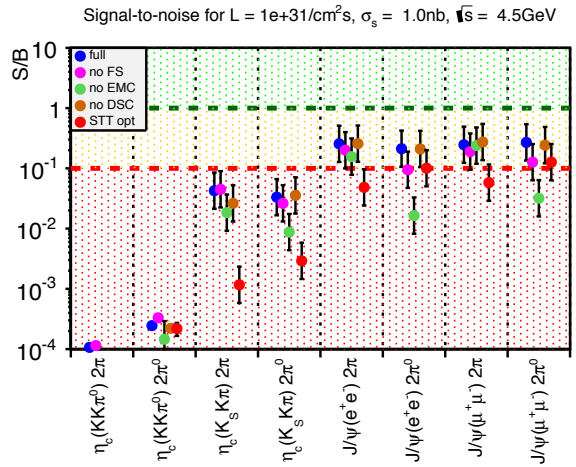
Present Results -- Summary

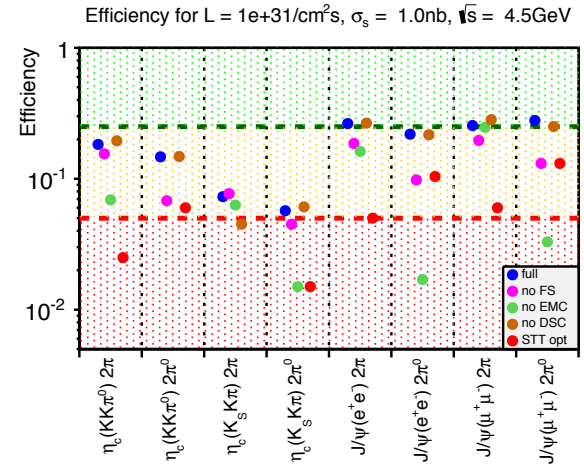
$\sigma_s = 1\text{nb}$, low luminosity

time | signal to backgrd | efficiency

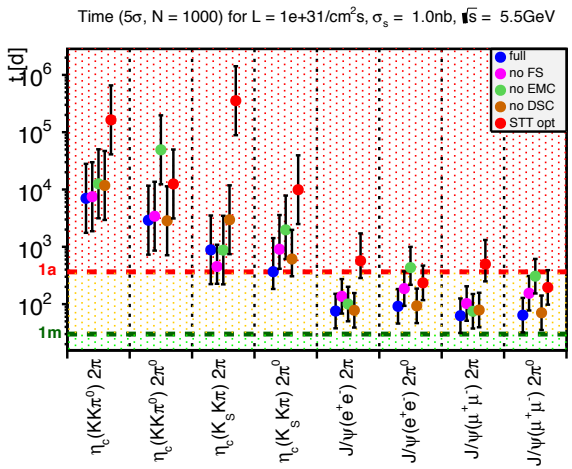
4.5 GeV

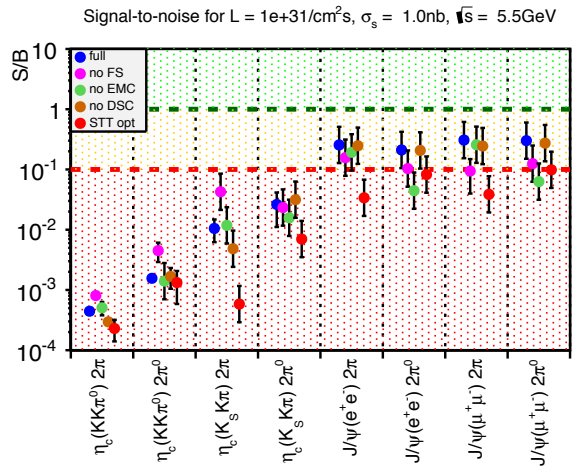


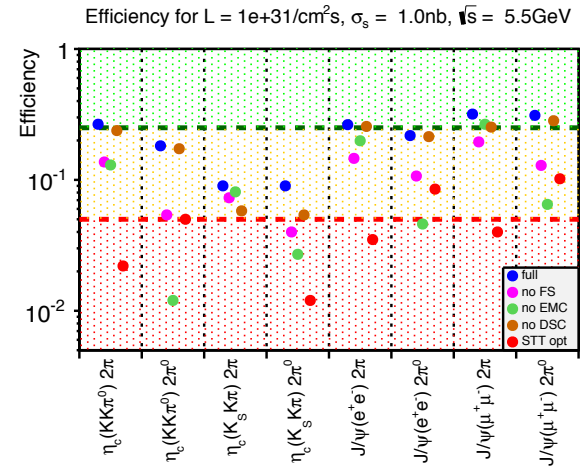




5.5 GeV





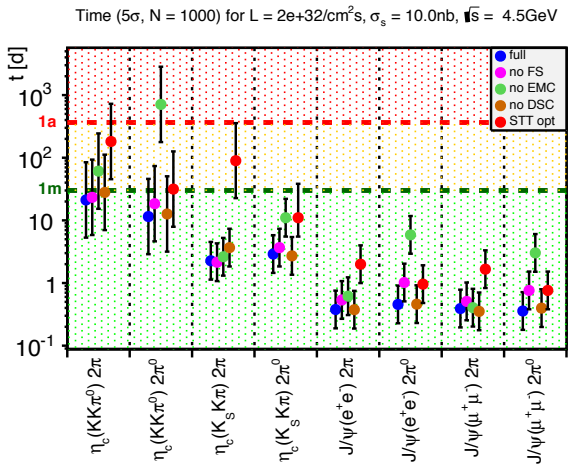


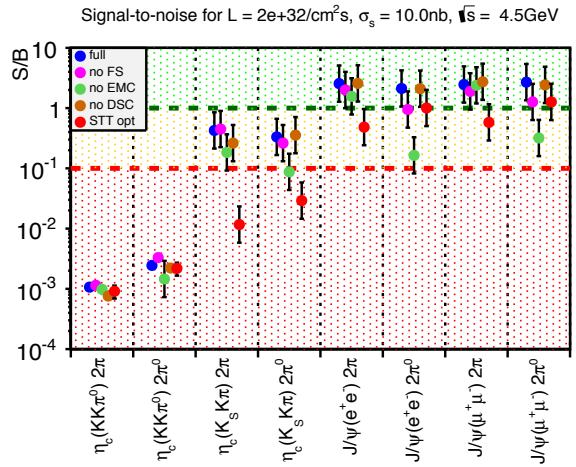
Present Results -- Summary

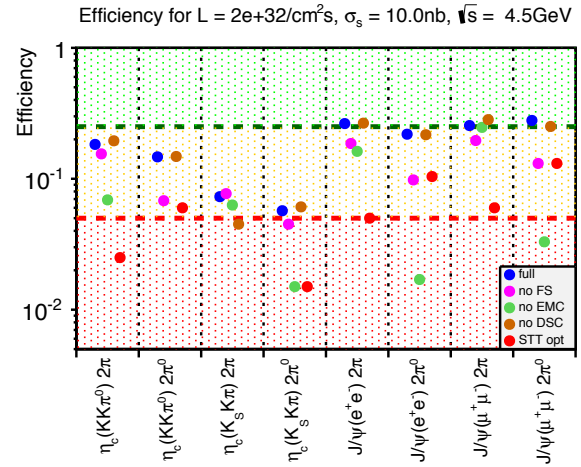
$\sigma_s = 10\text{nb}$, high luminosity

time | signal to backgrd | efficiency

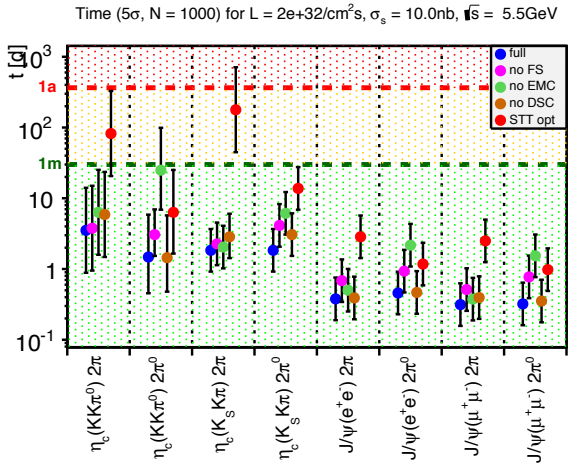
4.5 GeV

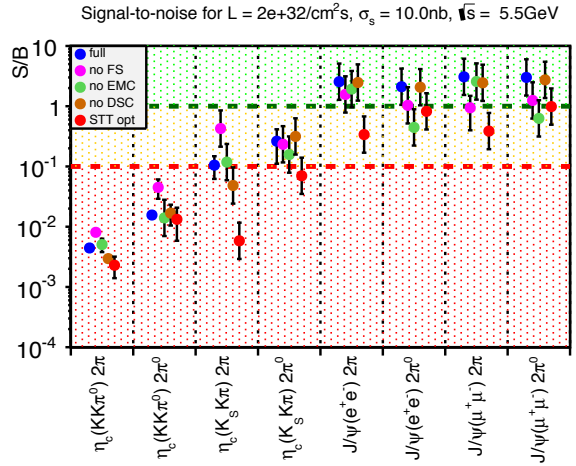


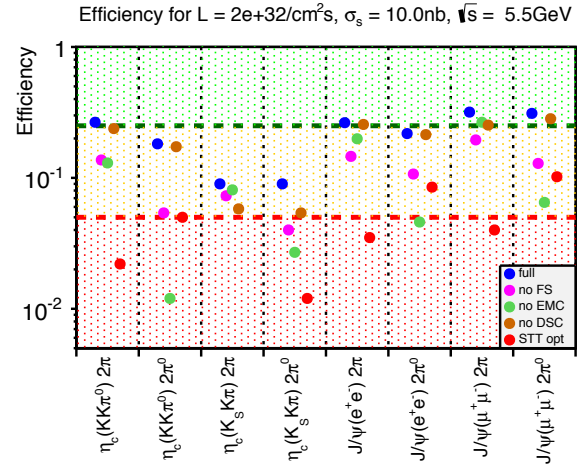




5.5 GeV

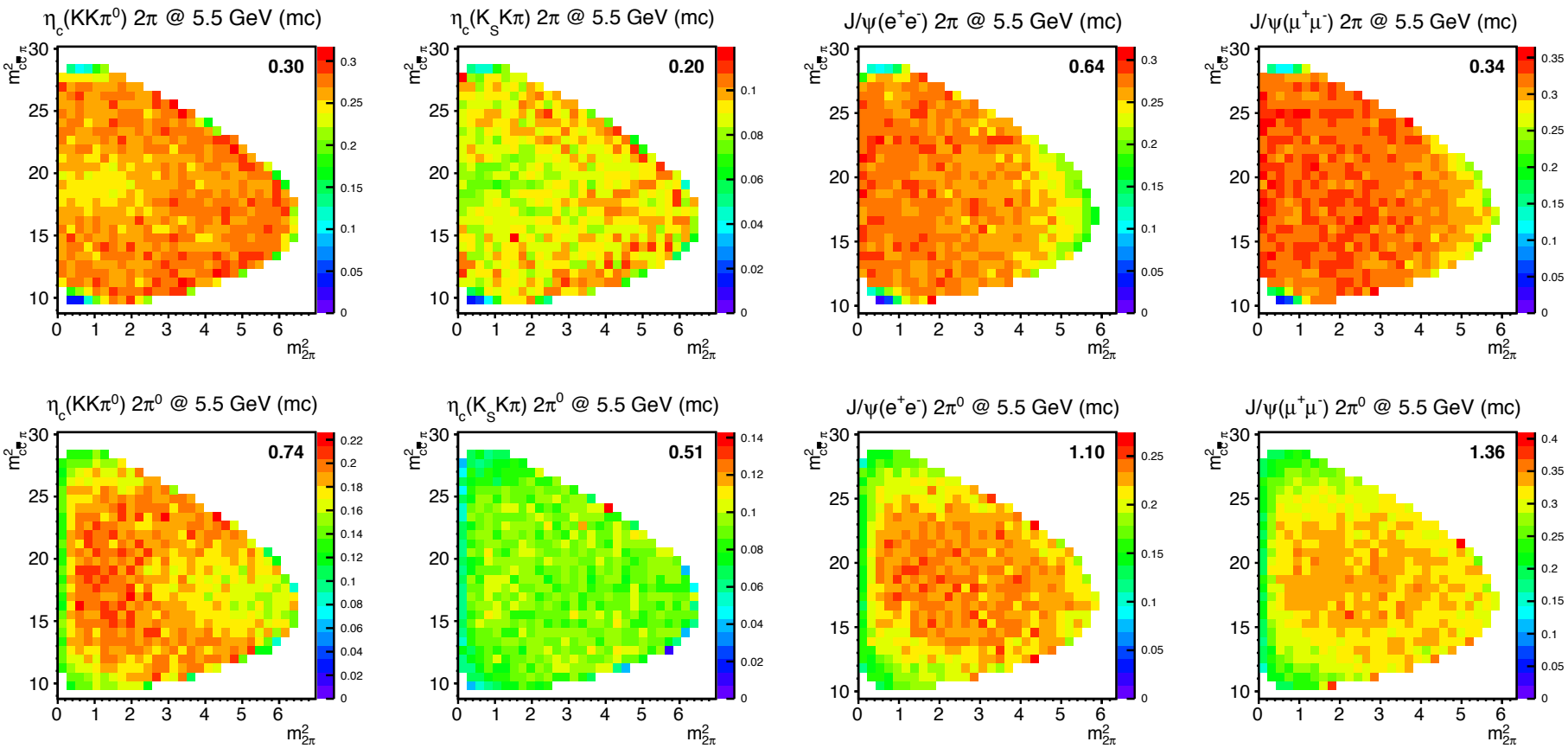




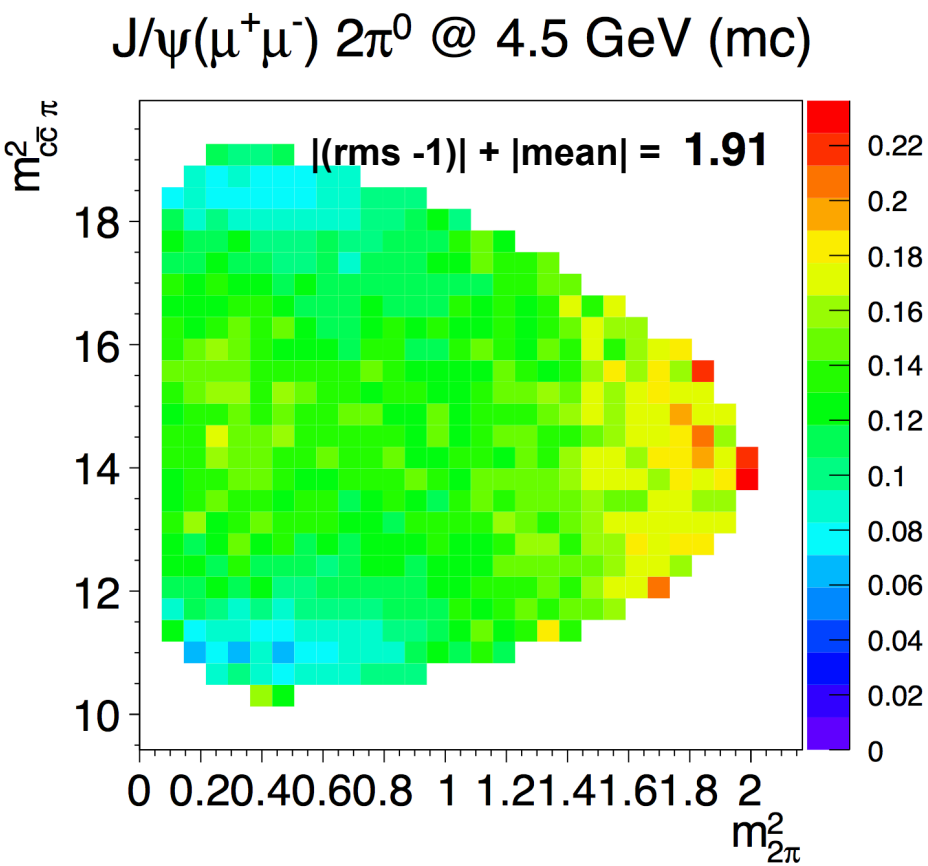


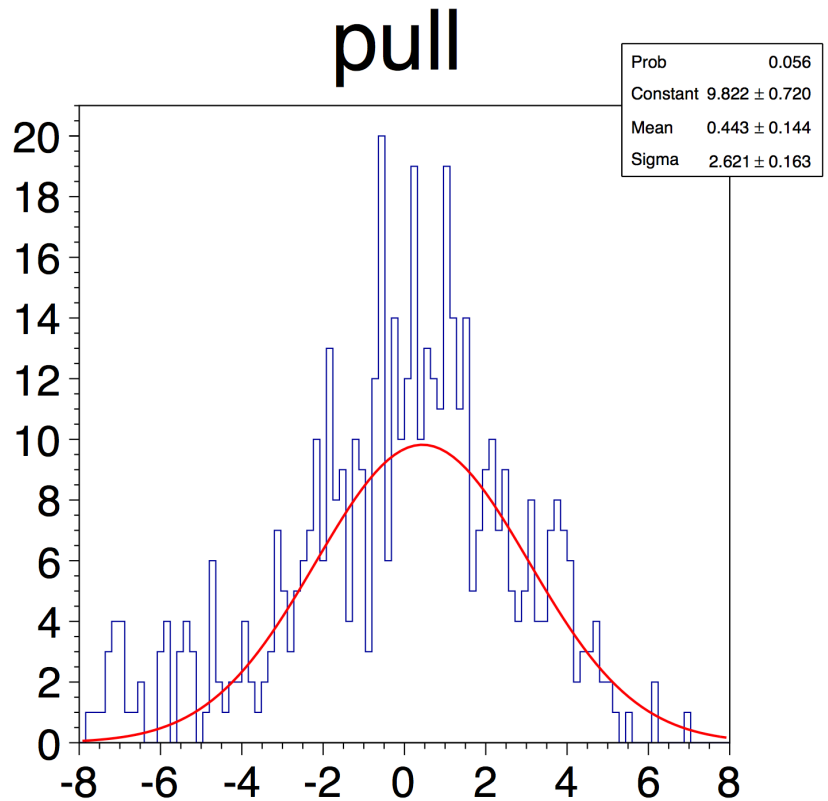
Dalitz plot studies: Efficiencies

Full Detector



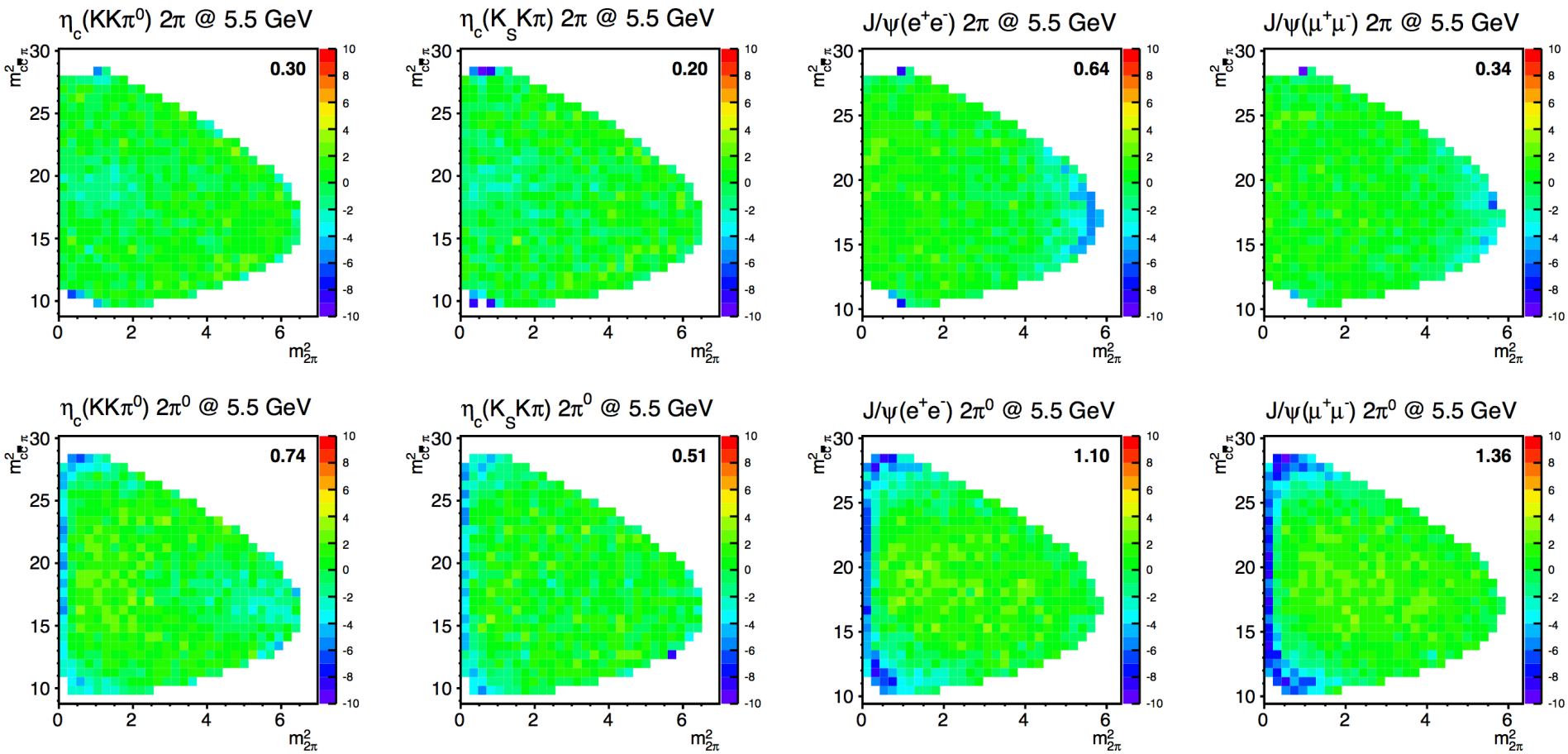
Dalitz plot studies: QA / „FoM“





Dalitz plot studies: Pulls

Full Detector



Overview & Summary Results FoMs

1nb	L/cms	1,0E+31														
E_cm	detopt	Full			No FS			No Emc Barrel			No Disc DIRC			STT only Tracking		
	mode	t [d]	S/B	Dal QA	t [d]	S/B	Dal QA	t [d]	S/B	Dal QA	t [d]	S/B	Dal QA	t [d]	S/B	Dal QA
4,5	etac(2Kpi0) 2pi	42324	0,0001	✓	46607	0,0001	✓	122059	0,0001	✓	55911	0,0001	✓	362845	0,0001	✓
	etac(2Kpi0) 2pi0	22961	0,0002	✓	36792	0,0003	✓	1E+06	0,0001	✓	25239	0,0002	✓	63002	0,0002	✓
	etac(KsKpi) 2pi	453	0,0426	✓	429,5	0,0449	✓	727,3	0,0184	✓	734,9	0,0262	✓	177361	0,0012	✓
	etac(KsKpi) 2pi0	580,2	0,0333	✓	734,9	0,0262	✓	6353,9	0,0087	✗	542,1	0,0356	✓	18952	0,0029	✓
	J/psi(2e) 2pi	75,6	0,2552	✓	107,3	0,1998	✓	123,2	0,1566	✓	75	0,2571	✓	399,1	0,0483	✓
	J/psi(2e) 2pi0	91,1	0,2117	✓	203,6	0,0947	✗	1815,1	0,0164	✗	92	0,2098	✓	191,9	0,1005	✓
	J/psi(2mu) 2pi	78,3	0,2465	✓	101,8	0,1895	✓	80,8	0,2388	✓	70,5	0,2736	✓	332,6	0,058	✓
	J/psi(2mu) 2pi0	71,5	0,2697	✗	152,3	0,1266	✗	604,7	0,0319	✗	79,5	0,2426	✗	152,3	0,1266	✓
5,5	etac(2Kpi0) 2pi	7013,6	0,0004	✓	7481,5	0,0008	✓	12585	0,0005	✓	11763	0,0003	✓	164015	0,0002	✓
	etac(2Kpi0) 2pi0	2914	0,0016	✓	3417,4	0,0045	✓	49278	0,0014	✓	2846	0,0017	✓	12488	0,0013	✓
	etac(KsKpi) 2pi	884	0,0105	✓	453	0,0426	✓	874,2	0,0118	✓	2963,3	0,0048	✓	354515	0,0006	✓
	etac(KsKpi) 2pi0	367,4	0,0262	✓	906,4	0,0233	✓	1974,7	0,0158	✗	612,4	0,0315	✓	9910,8	0,007	✓
	J/psi(2e) 2pi	75,6	0,2552	✓	136,7	0,1568	✓	100,3	0,1924	✓	78	0,2475	✓	570,2	0,0338	✓
	J/psi(2e) 2pi0	91,5	0,2107	✓	186,5	0,1034	✓	433,8	0,0445	✗	93,2	0,2069	✓	234,8	0,0822	✓
	J/psi(2mu) 2pi	62,8	0,3074	✓	102,3	0,0943	✓	75	0,2571	✓	78,9	0,2446	✓	498,9	0,0387	✓
	J/psi(2mu) 2pi0	64,2	0,3006	✓	154,7	0,1247	✗	307	0,0628	✗	70,5	0,2736	✓	195,6	0,0986	✓

Time QA (days)
green < 30 yellow < 365 red >= 365

S/B QA
green > 1 yellow > 0.1 red <= 0.1

Overview & Summary Results FoMs

10nb	L/cms	2,0E+32														
E_cm	detopt	Full			No FS			No Emc Barrel			No Disc DIRC			STT only Tracking		
	mode	t [d]	S/B	Dal QA	t [d]	S/B	Dal QA	t [d]	S/B	Dal QA	t [d]	S/B	Dal QA	t [d]	S/B	Dal QA
4,5	etac(2Kpi0) 2pi	21,2	0,0011	✓	23,3	0,0011	✓	61,1	0,001	✓	28	0,0008	✓	181,6	0,0009	✓
	etac(2Kpi0) 2pi0	11,5	0,0025	✓	18,5	0,0033	✓	709,7	0,0015	✓	12,6	0,0022	✓	31,6	0,0022	✓
	etac(KsKpi) 2pi	2,3	0,4258	✓	2,1	0,4492	✓	2,6	0,1838	✓	3,7	0,2625	✓	89,6	0,0117	✓
	etac(KsKpi) 2pi0	2,9	0,3325	✓	3,7	0,2625	✓	11	0,0875	✗	2,7	0,3558	✓	11	0,0292	✓
	J/psi(2e) 2pi	0,4	2,552	✓	0,5	1,9978	✓	0,6	1,566	✓	0,4	2,5713	✓	2	0,4833	✓
	J/psi(2e) 2pi0	0,5	2,117	✓	1	0,9473	✗	5,9	0,1643	✗	0,5	2,0977	✓	1	1,0053	✓
	J/psi(2mu) 2pi	0,4	2,465	✓	0,5	1,8947	✓	0,4	2,3877	✓	0,4	2,7357	✓	1,7	0,58	✓
	J/psi(2mu) 2pi0	0,4	2,697	✗	0,8	1,2663	✗	3	0,319	✗	0,4	2,4263	✗	0,8	1,2663	✓
5,5	etac(2Kpi0) 2pi	3,5	0,0044	✓	3,8	0,0081	✓	6,3	0,0051	✓	5,9	0,003	✓	82,2	0,0023	✓
	etac(2Kpi0) 2pi0	1,5	0,0156	✓	3,1	0,045	✓	24,9	0,014	✓	1,4	0,0168	✓	6,3	0,0133	✓
	etac(KsKpi) 2pi	1,8	0,105	✓	2,3	0,4258	✓	2	0,1181	✓	2,9	0,0483	✓	178,2	0,0058	✓
	etac(KsKpi) 2pi0	1,8	0,2625	✓	4,1	0,2333	✓	6,1	0,1575	✗	3,1	0,315	✓	13,8	0,07	✓
	J/psi(2e) 2pi	0,4	2,552	✓	0,7	1,5681	✓	0,5	1,9237	✓	0,4	2,4747	✓	2,9	0,3383	✓
	J/psi(2e) 2pi0	0,5	2,1073	✓	0,9	1,0343	✓	2,2	0,4447	✗	0,5	2,0687	✓	1,2	0,8217	✓
	J/psi(2mu) 2pi	0,3	3,074	✓	0,5	0,9425	✓	0,4	2,5713	✓	0,4	2,4457	✓	2,5	0,3867	✓
	J/psi(2mu) 2pi0	0,3	3,0063	✓	0,8	1,247	✗	1,5	0,6283	✗	0,4	2,7357	✓	1	0,986	✓

Time QA (days)
green < 30 yellow < 365 red >= 365

S/B QA
green > 1 yellow > 0.1 red <= 0.1

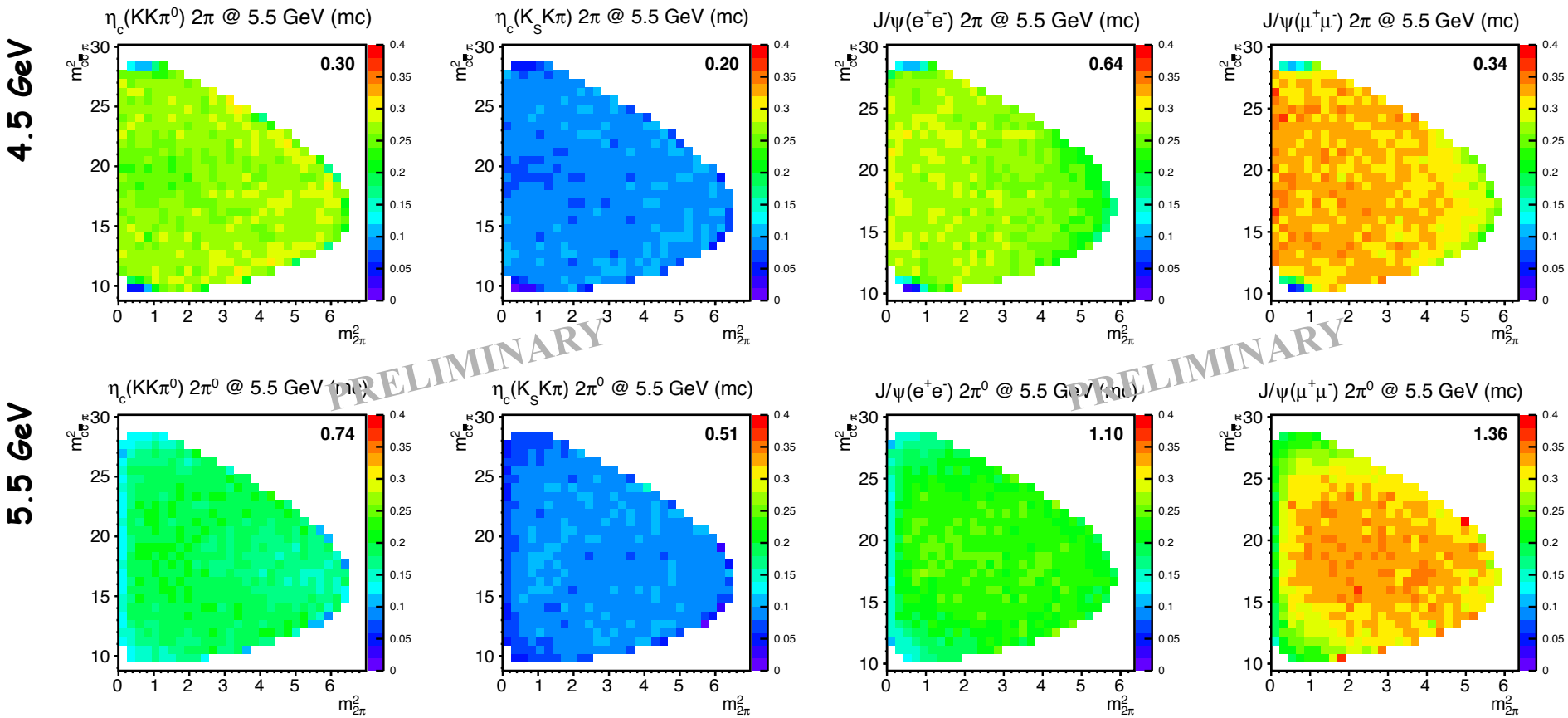
Summary

- ✓ **Extracted, proposed and used FoMs**
  - Time for 5s significance and 1000 signal evts (significance)
  - Signal to background (S/B)
  - Check for flatness of acceptance (Pulls-Dalitzplot)
- ✓ **Feasibility study for channels of interest done**
- ✓ **Results summarised by plots and tables**
  → *with traffic light indication*

Backup

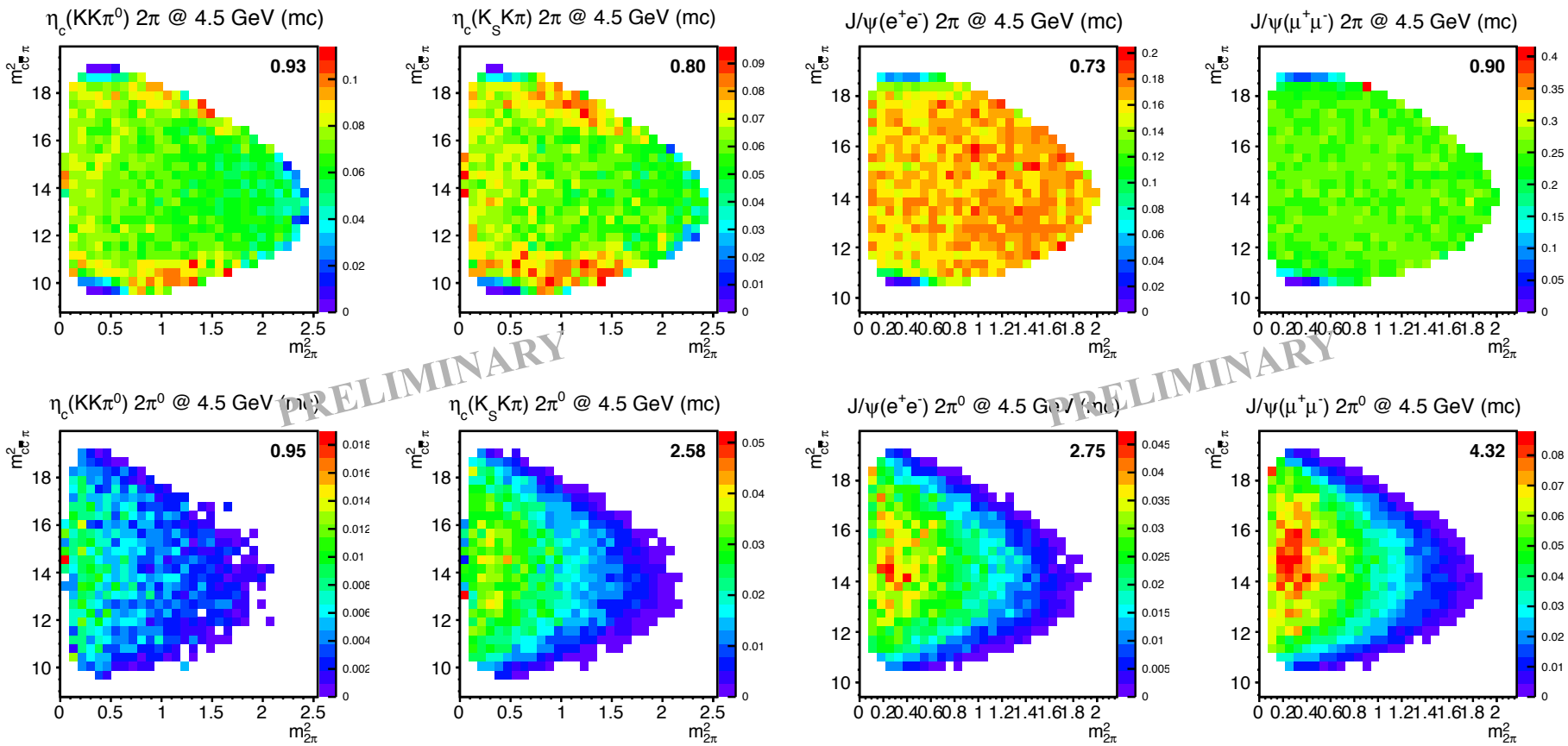
Present Results -- Summary

$\sigma_s = 10\text{nb}$, high luminosity



Present Results -- Summary

No EMC Barrel



Overview & compatibility

1nb	L/cms	1,0E+31														
E_cm	detopt	Full			No FS			No Emc Barrel			No Disc DIRC			STT only Tracking		
	mode	t [d]	S/B	Dal QA	t [d]	S/B	Dal QA	t [d]	S/B	Dal QA	t [d]	S/B	Dal QA	t [d]	S/B	Dal QA
4,5	etac(2Kpi0) 2pi	42324	0,0001	1,395	46607	0,0001	0,919	122059	0,0001	0,933	55911	0,0001	1,439	362845	0,0001	0,349
	etac(2Kpi0) 2pi0	22961	0,0002	0,974	36792	0,0003	1,111	1E+06	0,0001	0,948	25239	0,0002	0,969	63002	0,0002	0,706
	etac(KsKpi) 2pi	453	0,0426	0,847	429,5	0,0449	0,554	727,3	0,0184	0,801	734,9	0,0262	0,662	177361	0,0012	0,255
	etac(KsKpi) 2pi0	580,2	0,0333	0,529	734,9	0,0262	0,998	6353,9	0,0087	2,581	542,1	0,0356	0,541	18952	0,0029	0,212
	J/psi(2e) 2pi	75,6	0,2552	0,794	107,3	0,1998	0,806	123,2	0,1566	0,731	75	0,2571	0,925	399,1	0,0483	0,635
	J/psi(2e) 2pi0	91,1	0,2117	1,412	203,6	0,0947	1,856	1815,1	0,0164	2,751	92	0,2098	1,411	191,9	0,1005	1,153
	J/psi(2mu) 2pi	78,3	0,2465	0,742	101,8	0,1895	0,89	80,8	0,2388	0,898	70,5	0,2736	1,032	332,6	0,058	0,648
	J/psi(2mu) 2pi0	71,5	0,2697	1,639	152,3	0,1266	1,915	604,7	0,0319	4,318	79,5	0,2426	1,67	152,3	0,1266	1,168
5,5	etac(2Kpi0) 2pi	7013,6	0,0004	0,301	7481,5	0,0008	0,355	12585	0,0005	0,281	11763	0,0003	0,498	164015	0,0002	0,38
	etac(2Kpi0) 2pi0	2914	0,0016	0,74	3417,4	0,0045	0,96	49278	0,0014	1,131	2846	0,0017	0,798	12488	0,0013	0,476
	etac(KsKpi) 2pi	884	0,0105	0,202	453	0,0426	0,361	874,2	0,0118	0,303	2963,3	0,0048	0,233	354515	0,0006	0,479
	etac(KsKpi) 2pi0	367,4	0,0262	0,513	906,4	0,0233	1,101	1974,7	0,0158	2,392	612,4	0,0315	0,557	9910,8	0,007	0,501
	J/psi(2e) 2pi	75,6	0,2552	0,636	136,7	0,1568	0,501	100,3	0,1924	0,537	78	0,2475	0,71	570,2	0,0338	0,402
	J/psi(2e) 2pi0	91,5	0,2107	1,098	186,5	0,1034	1,382	433,8	0,0445	2,777	93,2	0,2069	1,229	234,8	0,0822	0,911
	J/psi(2mu) 2pi	62,8	0,3074	0,341	102,3	0,0943	0,377	75	0,2571	0,637	78,9	0,2446	0,583	498,9	0,0387	0,613
	J/psi(2mu) 2pi0	64,2	0,3006	1,363	154,7	0,1247	1,545	307	0,0628	3,494	70,5	0,2736	1,387	195,6	0,0986	0,858

Time QA

green	yellow	red
<30	<365	>=365

S/B QA

green	yellow	red
>1	>0.1	<=0.1

Dalitz QA

green	yellow	red
<0.5	<1	>=1

Overview & compatibility

10nb	L/cms	2,0E+32														
E_cm	detopt	Full			No FS			No Emc Barrel			No Disc DIRC			STT only Tracking		
	mode	t [d]	S/B	Dal QA	t [d]	S/B	Dal QA	t [d]	S/B	Dal QA	t [d]	S/B	Dal QA	t [d]	S/B	Dal QA
4,5	etac(2Kpi0) 2pi	21,2	0,0011	1,395	23,3	0,0011	0,919	61,1	0,001	0,933	28	0,0008	1,439	181,6	0,0009	0,349
	etac(2Kpi0) 2pi0	11,5	0,0025	0,974	18,5	0,0033	1,111	709,7	0,0015	0,948	12,6	0,0022	0,969	31,6	0,0022	0,706
	etac(KsKpi) 2pi	2,3	0,4258	0,847	2,1	0,4492	0,554	2,6	0,1838	0,801	3,7	0,2625	0,662	89,6	0,0117	0,255
	etac(KsKpi) 2pi0	2,9	0,3325	0,529	3,7	0,2625	0,998	11	0,0875	2,581	2,7	0,3558	0,541	11	0,0292	0,212
	J/psi(2e) 2pi	0,4	2,552	0,794	0,5	1,9978	0,806	0,6	1,566	0,731	0,4	2,5713	0,925	2	0,4833	0,635
	J/psi(2e) 2pi0	0,5	2,117	1,412	1	0,9473	1,856	5,9	0,1643	2,751	0,5	2,0977	1,411	1	1,0053	1,153
	J/psi(2mu) 2pi	0,4	2,465	0,742	0,5	1,8947	0,89	0,4	2,3877	0,898	0,4	2,7357	1,032	1,7	0,58	0,648
	J/psi(2mu) 2pi0	0,4	2,697	1,639	0,8	1,2663	1,915	3	0,319	4,318	0,4	2,4263	1,67	0,8	1,2663	1,168
5,5	etac(2Kpi0) 2pi	3,5	0,0044	0,301	3,8	0,0081	0,355	6,3	0,0051	0,281	5,9	0,003	0,498	82,2	0,0023	0,38
	etac(2Kpi0) 2pi0	1,5	0,0156	0,74	3,1	0,045	0,96	24,9	0,014	1,131	1,4	0,0168	0,798	6,3	0,0133	0,476
	etac(KsKpi) 2pi	1,8	0,105	0,202	2,3	0,4258	0,361	2	0,1181	0,303	2,9	0,0483	0,233	178,2	0,0058	0,479
	etac(KsKpi) 2pi0	1,8	0,2625	0,513	4,1	0,2333	1,101	6,1	0,1575	2,392	3,1	0,315	0,557	13,8	0,07	0,501
	J/psi(2e) 2pi	0,4	2,552	0,636	0,7	1,5681	0,501	0,5	1,9237	0,537	0,4	2,4747	0,71	2,9	0,3383	0,402
	J/psi(2e) 2pi0	0,5	2,1073	1,098	0,9	1,0343	1,382	2,2	0,4447	2,777	0,5	2,0687	1,229	1,2	0,8217	0,911
	J/psi(2mu) 2pi	0,3	3,074	0,341	0,5	0,9425	0,377	0,4	2,5713	0,637	0,4	2,4457	0,583	2,5	0,3867	0,613
	J/psi(2mu) 2pi0	0,3	3,0063	1,363	0,8	1,247	1,545	1,5	0,6283	3,494	0,4	2,7357	1,387	1	0,986	0,858

Time QA

green	yellow	red
<30	<365	>=365

S/B QA

green	yellow	red
>1	>0.1	<=0.1

Dalitz QA

green	yellow	red
<0.5	<1	>=1