

# Benchmark Channels for the DAQ TDR

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# Benchmark Channels for TDR

- **Proof-of-principle benchmark** channels for TDR needed
- Should cover **various aspects of day-1 physics**; discussion in PhysCom resulted in:
  1. High cross section / hyperon physics:  
 $\bar{p}p \rightarrow \Lambda\bar{\Lambda}$
  2. Small cross section case / charmonium:  
 $\bar{p}p \rightarrow J/\psi\pi^+\pi^-$
  3. Very small cross-section, exclusive / form factor physics:  
 $\bar{p}p \rightarrow e^+e^-(\pi^0)$

# Aspects for Software Trigger

- Mostly not triggered on exclusive channels
  1. Trigger **single**  $\Lambda/\bar{\Lambda}$ ; apply to events with different recoils?
  2. Trigger  $J/\psi \rightarrow \ell^+\ell^-$ ; apply to events with different recoils?
  3. Trigger **exclusively**  $e^+e^-$  and  $e^+e^-\pi^0$
- **Questions:**
  - At which energies?
  - Simultaneous triggering?
  - Simulation with current event-based full sim?
    - How treat worse online precision, event mixing (STT level)?
  - What detector configurations?
    - Full setup
    - Day-1 setup (no Disc DIRC, no RICH, worse Fwd Tracking?)

# Reminder Scrutiny

- FastSim detector variations were intensively studied already for Scrutiny Process
- Probably don't want to repeat

10nb		L/cms		1,0E+31																	
E <sub>cm</sub>	detopt	Full			No FS			No Emc Barrel			No Disc DIRC			No Barrel 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	t [d]	S/B	Dal QA		
5,5	$\eta_c(2K\pi^0) 2\pi$	70	0,004	✓	75	0,008	✓	126	0,005	✓	118	0,003	✓	198,00	0,002	✓	1644	0,002	✓		
	$\eta_c(2K\pi^0) 2\pi^0$	30	0,016	✓	61	0,045	✓	499	0,014	✓	29	0,017	✓	28,00	0,016	✓	126	0,013	✓		
	$\eta_c(2K\pi^0) 2\eta$	95	0,20	✓	276	0,078	✓	3584	0,012	✓	79	0,25	✓	79,00	0,082	✓	195	0,099	✓		
	$\eta_c(2K\pi^0) 2K$	14	0,079	✓	27	0,73	✓	25	0,086	✓	32	0,025	✓	25,0	0,041	✓	150	0,13	✓		
	$\eta_c(KsK\pi) 2\pi$	37	0,11	✓	45	0,43	✓	41	0,12	✓	57	0,048	✓	75,00	0,086	✓	3564	0,006	✓		
	$\eta_c(KsK\pi) 2\pi^0$	37	0,26	✓	83	0,23	✓	123	0,16	✗	61	0,32	✓	75,00	0,26	✓	276	0,070	✓		
	$\eta_c(KsK\pi) 2\eta$	100	0,19	✓	367	0,053	✓	1445	0,019	✓	114	0,17	✓	100,00	0,19	✓	906	0,023	✓		
	$\eta_c(KsK\pi) 2K$	28	0,69	✓	41	0,47	✓	26	0,74	✓	77	0,25	✓	60,00	0,32	✓	906	0,023	✓		
	$J/\psi(2e) 2\pi$	7,6	2,6	✓	14	1,6	✓	10	1,9	✓	7,8	2,5	✓	8,0	2,4	✓	57	0,34	✓		
	$J/\psi(2e) 2\pi^0$	9,2	2,1	✓	19	1,0	✓	43	0,44	✗	9,3	2,1	✓	9,5	2,0	✓	24	0,82	✓		
	$J/\psi(2e) 2\eta$	38	0,57	✓	111	0,19	✓	399	0,054	✗	37	0,58	✓	38	0,51	✓	91	0,21	✓		
	$J/\psi(2e) 2K$	7,2	2,7	✓	10	2,0	✓	7,4	2,6	✓	7,2	2,7	✓	7,4	2,9	✓	67	0,29	✓		
	$J/\psi(2\mu) 2\pi$	6,3	3,1	✓	10	0,94	✓	7,5	2,6	✓	7,9	2,4	✓	7,8	2,8	✓	50	0,39	✓		
	$J/\psi(2\mu) 2\pi^0$	6,4	3,0	✓	16	1,2	✗	31	0,63	✗	7,1	2,7	✓	7,2	2,7	✓	20	0,99	✓		
	$J/\psi(2\mu) 2\eta$	24	0,82	✓	69	0,31	✓	249	0,086	✗	24	0,82	✓	24	0,82	✓	67	0,29	✓		
	$J/\psi(2\mu) 2K$	5,1	3,8	✓	6,3	3,1	✓	5,5	3,5	✓	5,3	3,7	✓	5,1	3,8	✓	49	0,40	✓		

# Summary

- Identified 3 benchmark channels
  - Need energies where to trigger
  - Need some more input on details how to trigger
  - Need FullSim configured to meet full and day-1 setup