L0 Bandwidth Division with Multiple Interaction Events

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- Status as of Dec. 2002 - reminder

- L0 efficiencies for single + multiple interactions

- Status of the L0 efficiencies

Status as of Dec. 2002: reminder

Physics channels studied as of Dec. 2002:

$B_s \to J/\Psi(\mu\mu)\, \phi\, (KK)$ $B_s \to J/\Psi(ee)\, \phi\, (KK)$

$B_d \to \pi\, \pi$ $B_s \to K\, K$

$B_d \to K\, \pi$

$B_s \to D_s(KK\pi)\, K$ $B_s \to D_s(KK\pi)\, \pi$

$B_d \to K^* \gamma$

✓ only for true single interaction events for signal channels

✓ all minimum bias events

✓ cut on the 2nd pile-up veto peak chosen at 2

Status as of Dec. 2002: reminder (II)

Chosen operating point:

L0 trigger	E_T^{had}	E_T^μ	E_T^e	E_T^γ	$E_T^{\mu\mu}$	π^0_{global}	π^0_{local}
Thresholds (GeV)	3.23	0.92	2.85	3.0	2.5	4.1	4.6
L0 eff. (%)	$\pi\,\pi$	KK	$J/\Psi(\mu\mu)\,\phi$	$J/\Psi(ee)\,\phi$	$D_s\,K$	$D_s\,\pi$	$K^*\,\gamma$
true singles	65	60	91	49	47	46	76
all int.	55	51	89	42	41	-	66

… how will the situation change when looking at all events, not only single int.?
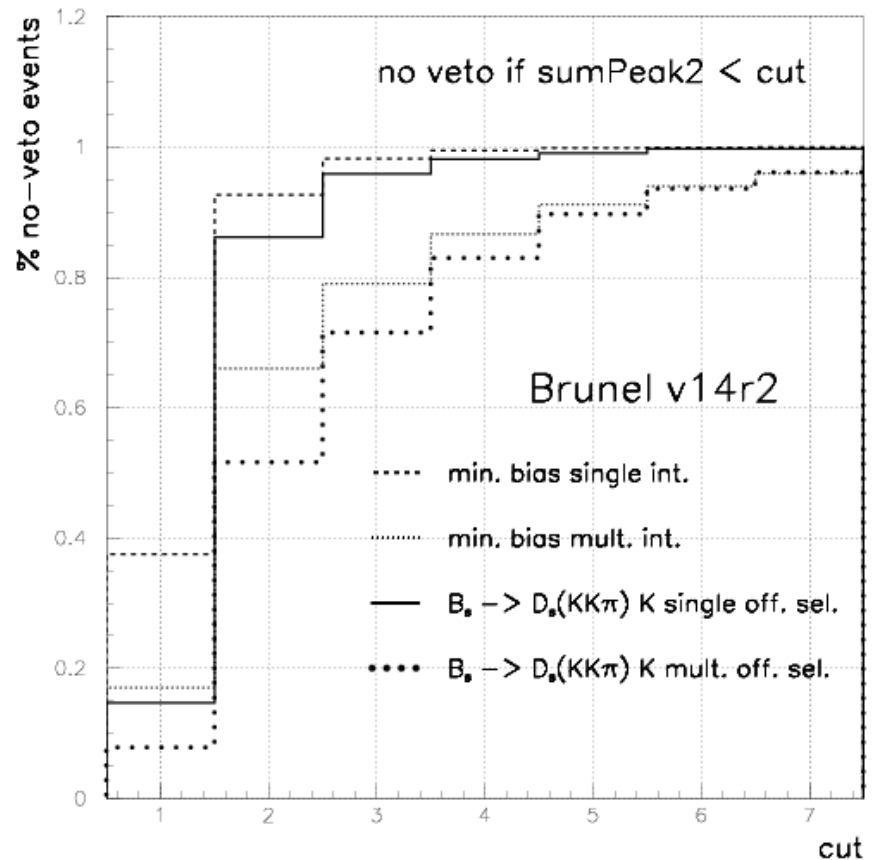
➡ pile-up veto will tend to be "softer"?

Pile-up Veto Scenarios

A softer pile-up veto (cut @ 2 -> 3):

- ~86% single. off. sel. events -> ~ 95%

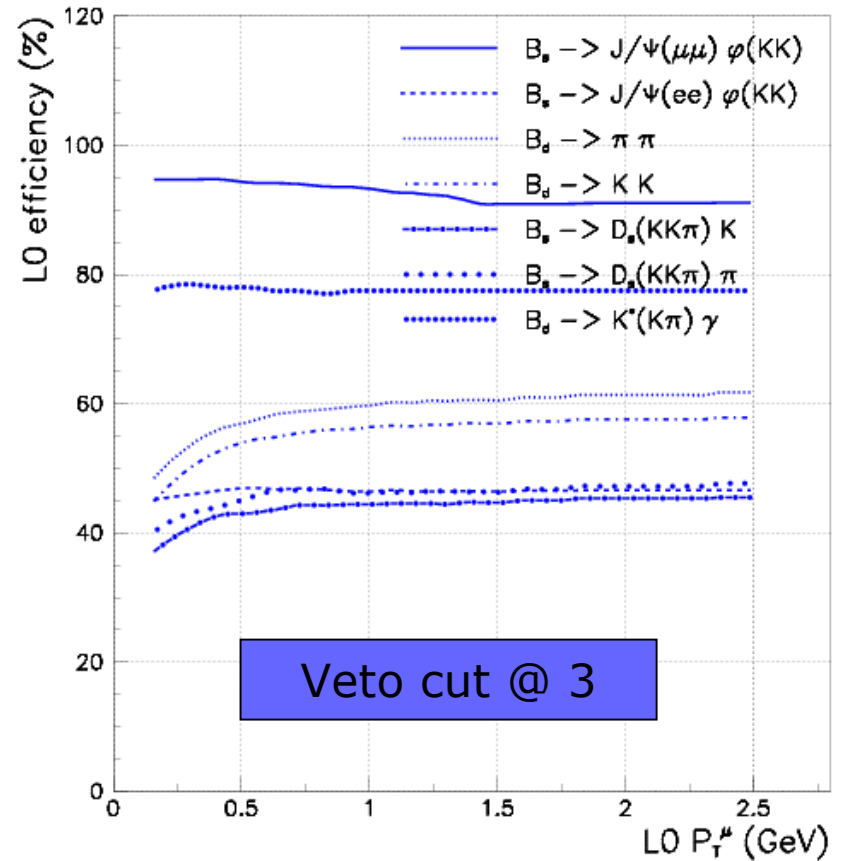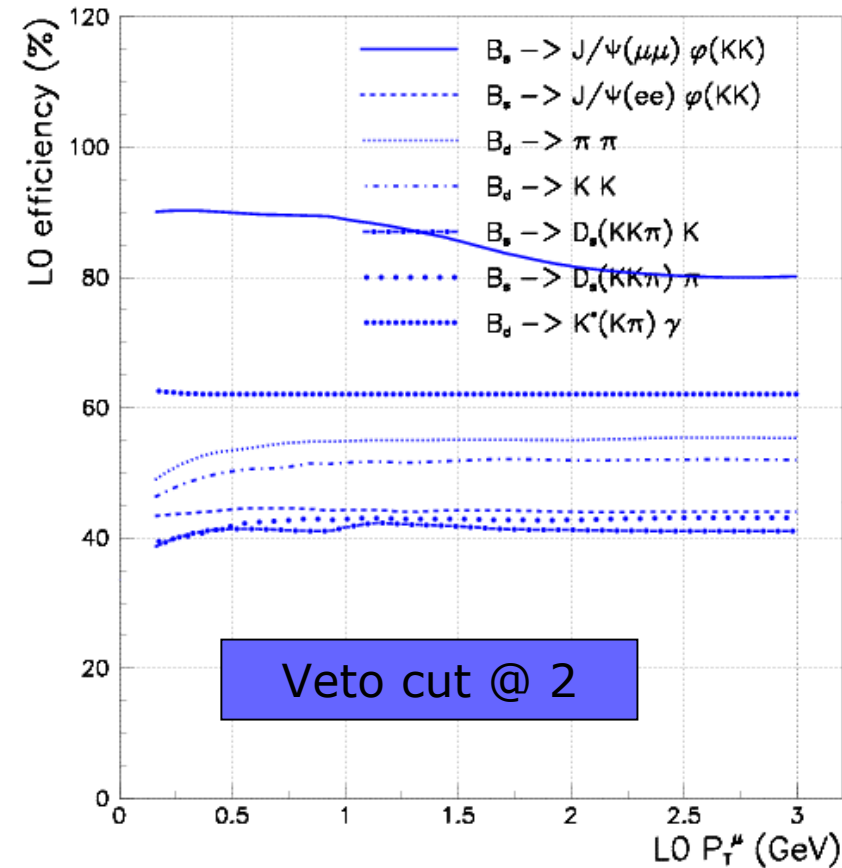- ~52% mult. off. sel. events -> ~ 71%

$\Rightarrow$ how do the efficiencies change?

Optimising L0 for all interactions ...

no veto if sumPeak2 < cut

% no-veto events

Brunel v14r2

····· min. bias single int.

········ min. bias mult. int.

—— $B_s -> D_s(KK\pi) K$ single off. sel.

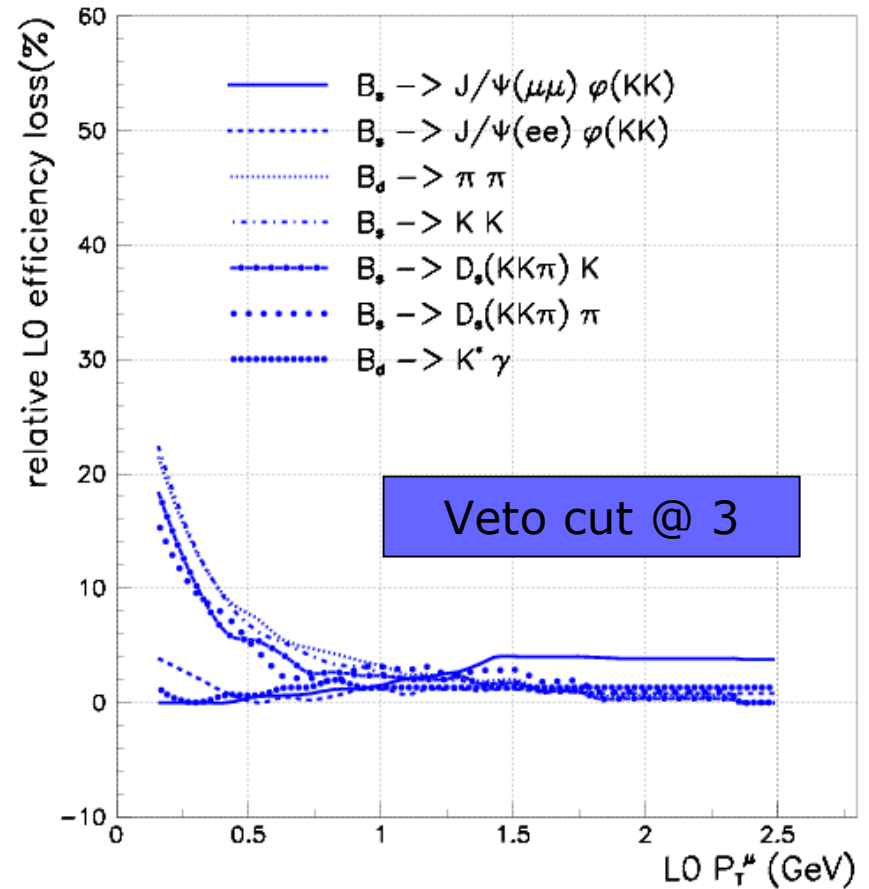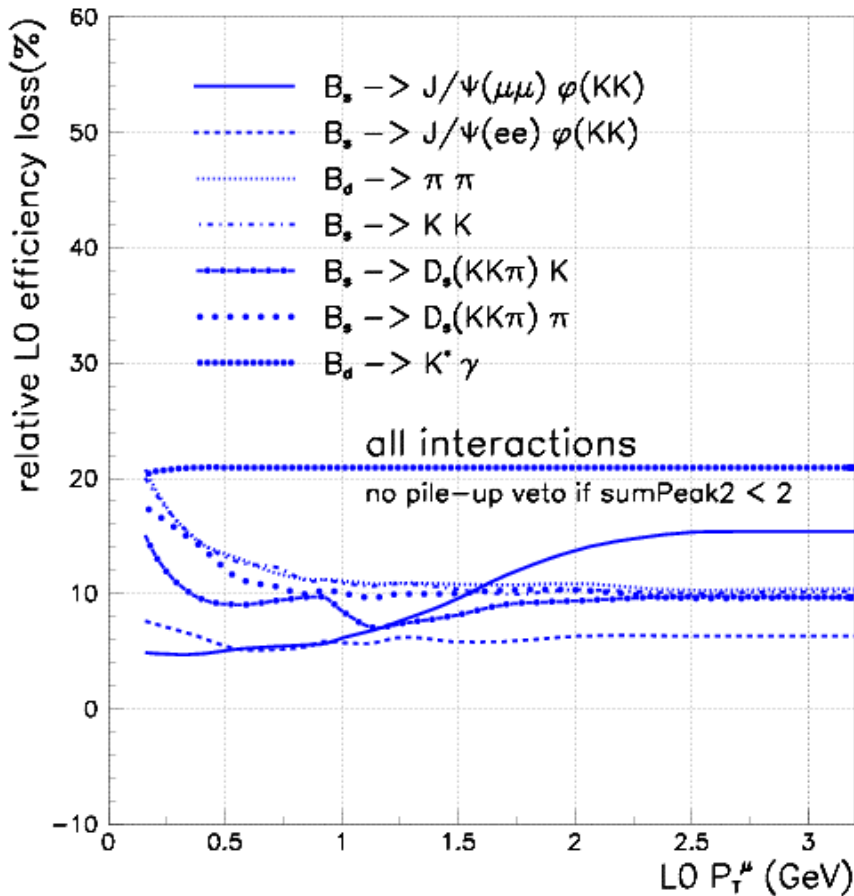···· $B_s -> D_s(KK\pi) K$ mult. off. sel.

cut

New L0 Efficiencies with no Pile-up Veto if sumPeak2 < 2,3

L0 efficiencies for ALL events

New Losses in Efficiency

Net improvement !

Present Status

NEW operating point:

L0 trigger	E_T^{had}	E_T^{μ}	E_T^e	E_T^{γ}	$E_T^{\mu\mu}$	π^0_{global}	π^0_{local}	
Thresholds (GeV)	3.51	1.45	3.56	3.00	1.43	4.1	4.6	
L0 eff. (%)	$\pi\,\pi$	KK	K π	J/$\Psi(\mu\mu)$ ϕ	J/Ψ(ee) ϕ	D_s K	D_s π	K^* γ
true singles	67	63	69	90	50	49	48	89
all int.	61	57	61	91	46	45	46	77

✓ cut on the 2nd pile-up veto peak now chosen at 3 !

Outlook

- The inclusion of offline selected multiple interaction events in the L0 optimisation changes the L0 performance and its response

- **Multiple interaction (signal) events favour a softer pile-up veto**

- **Improvements in the offline selection also explain the increase in efficiencies**