Effects of cluster splitting Threshold at 120 MeV on the Form Factor analysis

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Old Thr		New Thr
100 MeV	$\rightarrow$	120 MeV

1. Number of form factor events.
2. Efficiencies.
3. Background contamination.
4. Form factor results.

New and Old form factor events and efficiencies.

Number of events

s (GeV^2)	$N_{\texttt{Old}}$	$N_{\texttt{New}}$
11.42	8	8
11.93	3	3
12.43	31	34

Efficiency of the preselection

$$\epsilon_{pres}^{\texttt{new}} = 0.950 \pm 0.012(stat)^{+0.042}_{-0.030}(syst)$$
$$\epsilon_{pres}^{\texttt{old}} = 0.966 \pm 0.013(stat)^{+0.027}_{-0.036}(syst)$$

Efficiency of the selection

$$\epsilon_{sel}^{\texttt{new}} = 0.706 \pm 0.009(stat)^{+0.046}_{-0.020}(syst)$$
$$\epsilon_{sel}^{\texttt{old}} = 0.679 \pm 0.009(stat)^{+0.037}_{-0.026}(syst)$$

Efficiency of the overall analysis

$$\epsilon_{ana} = \epsilon_{trig} \times \epsilon_{pres} \times \epsilon_{sel}$$

$$\epsilon_{ana}^{\texttt{new}} = 0.604 \pm 0.017(stat)^{+0.047}_{-0.025}(syst)$$
$$\epsilon_{ana}^{\texttt{old}} = 0.590 \pm 0.017(stat)^{+0.036}_{-0.032}(syst)$$

New background evaluation

Inclusive J/ψ events

- at χ_0 energy: same number of FF events at all energies around $\chi_0 \Rightarrow$ same $\sigma_{J/\psi X}$
- at h_c energy: $\sigma_{J/\psi X} = \alpha \times \sigma(\overline{p}p \to J/\psi \pi^0)$

$$\alpha^{\texttt{new}} = 4 \times 10^{-3}$$
$$\alpha^{\texttt{old}} = 3 \times 10^{-3}$$

Photons convertion and π^0 Dalitz decay

$$\sigma_p < \omega \left[(\delta + 2\eta)^2 \sigma'_{\pi^0\pi^0} + (\delta + 2\eta)\eta\sigma'_{\pi^0\gamma} + \eta^2 \sigma_{\gamma\gamma} \right]$$

$$\omega^{\texttt{new}} = 8 \times 10^{-3}$$
$$\omega^{\texttt{old}} = 6 \times 10^{-3}$$

- but in the paper we always use upper limit $\omega < 10^{-2}$.
- New threshold does not affect the measure of η.

New background results

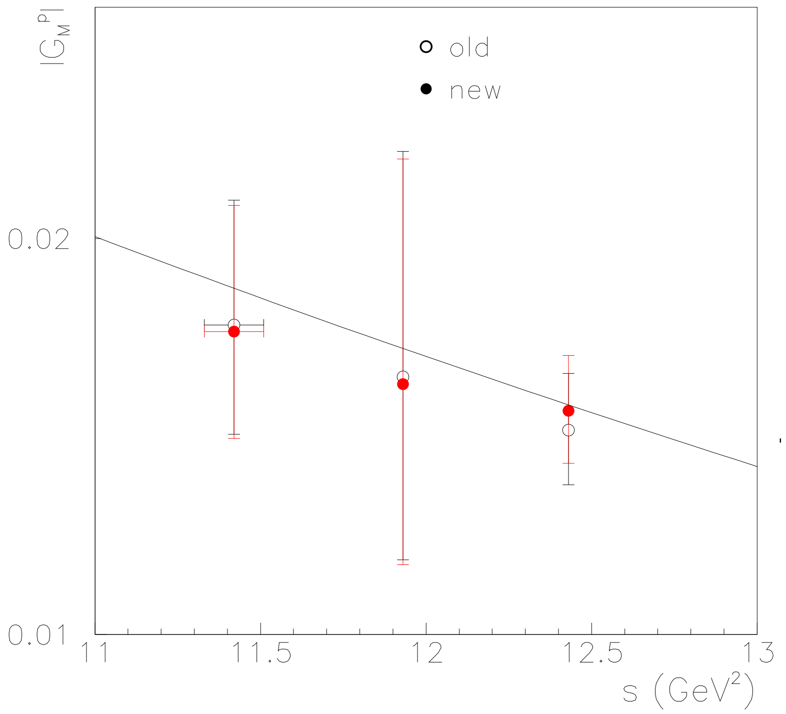
s (GeV^2)	$\sigma_{J/\psi X}$ (pb)	σ_p (pb)	σ_h (pb)	σ_B (pb)
11.42	3.0×10^{-2}	3.1×10^{-3}	4.3×10^{-3}	3.7×10^{-2}
11.93	2.3×10^{-2}	2.0×10^{-3}	3.6×10^{-3}	2.9×10^{-2}
12.43	2.0×10^{-2} $\left(1.5 \times 10^{-2}\right)$	1.7×10^{-3}	2.9×10^{-3}	2.5×10^{-2} $\left(2.0 \times 10^{-2}\right)$
14.40	$< 2.0 \times 10^{-2}$ $\left(1.5 \times 10^{-2}\right)$	$< 0.9 \times 10^{-3}$	$< 0.7 \times 10^{-3}$	$< 2.2 \times 10^{-2}$ $\left(1.7 \times 10^{-2}\right)$
18.22	$< 2.0 \times 10^{-2}$ $\left(1.5 \times 10^{-2}\right)$	$< 0.9 \times 10^{-3}$	$< 0.7 \times 10^{-3}$	$< 2.2 \times 10^{-2}$ $\left(1.7 \times 10^{-2}\right)$

Again background contamination is negligible.

- New threshold does not affect the hadronic final states analysis.

New Form Factor results

s (GeV^2)	σ_{acc} (pb)	$10^2 \times \lvert G_M \rvert$ (a)	(b)
11.42$\pm$0.09	$1.56^{+0.77+0.12}_{-0.54-0.06}$ $(1.59^{+0.79+0.10}_{-0.55-0.09})$	$1.70^{+0.42+0.07}_{-0.29-0.04}$ $(1.72^{+0.42+0.05}_{-0.30-0.05})$	$1.90^{+0.47+0.07}_{-0.33-0.04}$ $(1.92^{+0.47+0.06}_{-0.33-0.05})$
11.93$\pm$0.13	$1.26^{+1.22+0.10}_{-0.68-0.05}$ $(1.29^{+1.25+0.08}_{-0.70-0.07})$	$1.55^{+0.75+0.06}_{-0.42-0.03}$ $(1.57^{+0.76+0.05}_{-0.43-0.04})$	$1.72^{+0.84+0.07}_{-0.47-0.04}$ $(1.74^{+0.85+0.05}_{-0.47-0.05})$
*12.43$\pm$0.01	$1.11^{+0.23+0.09}_{-0.19-0.05}$ $(1.04^{+0.22+0.06}_{-0.19-0.06})$	$1.48^{+0.15+0.05}_{-0.13-0.03}$ $(1.43^{+0.15+0.04}_{-0.13-0.04})$	$1.63^{+0.17+0.06}_{-0.14-0.03}$ $(1.58^{+0.17+0.05}_{-0.14-0.04})$
14.40$\pm$0.19	< 0.80 (< 0.82)	< 1.38 (< 1.40)	< 1.51 (< 1.53)
18.22$\pm$0.01	< 1.98 (< 2.03)	< 2.77 (< 2.81)	< 2.99 (< 3.03)



All Form Factor results