

Measurement of the χ_{c1} and χ_{c2} polarizations in proton-proton collisions at
 $\sqrt{s} = 8 \text{ TeV}$

–Supplemental material–
 Numerical values of the measured yield ratios

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TABLE I. The ratio of the χ_{c2} to χ_{c1} yields, corrected for acceptance and efficiencies, vs. φ , in three J/ψ p_T ranges. The average φ values are also given.

J/ψ p_T (GeV)	φ (degrees)	$\langle\varphi\rangle$ (degrees)	χ_{c2}/χ_{c1}
8–12	0–15	7.8	$0.451^{+0.027}_{-0.025}$
	15–30	22.6	$0.452^{+0.026}_{-0.025}$
	30–45	37.6	$0.499^{+0.027}_{-0.026}$
	45–60	52.6	$0.472^{+0.025}_{-0.024}$
	60–75	67.6	$0.450^{+0.023}_{-0.022}$
	75–90	82.5	$0.445^{+0.023}_{-0.022}$
12–18	0–15	7.7	$0.438^{+0.021}_{-0.020}$
	15–30	22.5	$0.393^{+0.018}_{-0.017}$
	30–45	37.5	$0.412^{+0.019}_{-0.018}$
	45–60	52.4	$0.449^{+0.020}_{-0.019}$
	60–75	67.5	$0.445^{+0.020}_{-0.019}$
	75–90	82.5	$0.400^{+0.018}_{-0.017}$
18–30	0–15	7.6	$0.425^{+0.030}_{-0.028}$
	15–30	22.6	$0.412^{+0.028}_{-0.027}$
	30–45	37.5	$0.420^{+0.030}_{-0.028}$
	45–60	52.5	$0.421^{+0.030}_{-0.028}$
	60–75	67.6	$0.399^{+0.028}_{-0.026}$
	75–90	82.5	$0.409^{+0.028}_{-0.027}$

TABLE II. The ratio of the χ_{c2} to χ_{c1} yields, corrected for acceptance and efficiencies, vs. $|\cos \vartheta|$, in three J/ψ p_T ranges. The average $|\cos \vartheta|$ values are also given. Fitting these ratios to a flat function (unpolarized scenario) leads to $\chi^2/\text{ndf} = 7.2/5$, $13.5/6$, and $10.3/4$, respectively for the p_T ranges 8–12, 12–18, and 18–30 GeV; the corresponding values for the NRQCD prediction are 4.1/5, 4.9/6, and 4.2/4.

J/ψ p_T (GeV)	$ \cos \vartheta $	$\langle \cos \vartheta \rangle$	χ_{c2}/χ_{c1}
8–12	0.000–0.075	0.037	$0.453^{+0.018}_{-0.018}$
	0.075–0.150	0.111	$0.468^{+0.021}_{-0.020}$
	0.150–0.225	0.185	$0.489^{+0.025}_{-0.024}$
	0.225–0.300	0.259	$0.439^{+0.024}_{-0.025}$
	0.300–0.375	0.332	$0.388^{+0.035}_{-0.031}$
	0.375–0.450	0.404	$0.411^{+0.056}_{-0.054}$
12–18	0.000–0.075	0.038	$0.476^{+0.023}_{-0.021}$
	0.075–0.150	0.113	$0.438^{+0.020}_{-0.019}$
	0.150–0.225	0.187	$0.421^{+0.020}_{-0.019}$
	0.225–0.300	0.262	$0.397^{+0.021}_{-0.019}$
	0.300–0.375	0.336	$0.398^{+0.022}_{-0.021}$
	0.375–0.450	0.409	$0.376^{+0.026}_{-0.024}$
18–30	0.450–0.625	0.502	$0.392^{+0.033}_{-0.032}$
	0.000–0.150	0.076	$0.445^{+0.036}_{-0.032}$
	0.150–0.300	0.225	$0.456^{+0.030}_{-0.027}$
	0.300–0.375	0.338	$0.463^{+0.039}_{-0.036}$
	0.375–0.450	0.412	$0.365^{+0.032}_{-0.030}$
	0.450–0.625	0.526	$0.370^{+0.027}_{-0.025}$