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Measurements of $\Upsilon(nS)$ polarization with the CMS experiment

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The polarizations of the $\Upsilon(1S)$, $\Upsilon(2S)$ and $\Upsilon(3S)$ mesons produced in proton-proton collisions at $\sqrt{s} = 7$ TeV are measured using a data sample collected with the CMS detector at the LHC, corresponding to an integrated luminosity of around 5 fb^{-1} . The measurements are based on the analysis of the dimuon decay angular distributions, analyzed in three different polarization frames, and are presented as a function of the Upsilon transverse momentum, in two rapidity ranges. The measurement of the polarization parameters, λ_{θ} , λ_{ϕ} and $\lambda_{\theta\phi}$ is complemented by the determination of the frame-invariant quantity $\lambda_{\tilde{}}$, which provides a very useful intrinsic test of the reliability of the whole analysis chain and supplementary physical information.

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