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Glueball search in pp collisions at $\sqrt{s} = 13.6$ TeV with the ALICE detector

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Quantum Chromodynamics (QCD) predicts the existence of gluonic bound states known as \textit{glueballs}, composed entirely of gluons. Their experimental identification remains elusive due to possible mixing with nearby scalar mesons. The high-statistics proton–proton data at $\sqrt{s} = 13.6$ TeV recorded with the ALICE detector provide a new opportunity to explore such states. In this work, resonances reconstructed via the $\mathrm{K}^0_\mathrm{S}\mathrm{K}^0_\mathrm{S}$ decay channel are studied at midrapidity. Masses and widths are extracted and compared with lattice-QCD predictions for the lightest scalar glueball candidate. Transverse-momentum spectra and yields are measured to investigate the production mechanism of these states. These measurements provide new insights into the search for glueballs in high-energy collisions.

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