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Measurement of $f_0(980)$ resonance production in pp collisions at $\sqrt{s} = 13.6$ TeV with ALICE

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Short-lived resonances are powerful probes to study the hadronic phase in high-energy collisions, as their lifetimes are comparable to the duration of the hadronic stage. Their yields and spectral properties are affected by the interplay between rescattering and regeneration processes in the hadronic phase. Among them, the $f_0(980)$ resonance, with a lifetime of about 3–5 fm/c as reported by ALICE, is particularly sensitive to these effects and remains of special interest due to its debated internal structure, which may correspond to an exotic meson, tetraquark, or meson−molecule configuration. This contribution presents a study of $f_0(980)$ production in pp collisions at $\sqrt{s} = 13.6$ TeV recorded by the ALICE detector during LHC Run 3. The resonance was reconstructed through its main decay channel, the $f_0(980) \rightarrow \pi^+\pi^-$, with particular attention to tracking of charged-pion and particle identification in the central barrel. The significantly increased Run 3 statistics allow for a more precise determination of the yields and mass spectra as functions of transverse momentum and charged-particle multiplicity. The multiplicity dependence of the $f_0(980)$ yield is compared with previous Run 2 measurements and other short-lived resonances, providing insight into the rescattering dynamics and possible modification of the resonance properties in small collision systems. The results also contribute to the ongoing discussion on the internal structure of the $f_0(980)$ and serve as a reference for future measurements in p–Pb and Pb–Pb collisions.

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