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Exclusive diffractive production of $\pi^+\pi^-$ continuum and resonances within tensor pomeron approach

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Collaboration

Abstract content

We discuss exclusive central diffractive dipion production in the reactions $pp \to pp\pi^+\pi^-$ and $p\bar{p} \to p\bar{p}\pi^+\pi^-$ at high energies. The calculation is based on a tensor pomeron model and the amplitudes for the processes are formulated in an effective field-theoretic approach [1]. We include the purely diffractive dipion continuum, and the scalar and tensor resonances decaying into the $\pi^+\pi^-$ pairs [2, 3] as well as the photoproduction contributions (ρ^0, Drell-S\"oding) [4]. We discuss how two pomerons couple to tensor meson $f_2(1270)$ and the interference effects of resonance and dipion continuum for the first time. The theoretical results are compared with existing STAR, CDF, and CMS experimental data. Predictions for planned or being carried out experiments (ALICE, ATLAS) are presented. We show the influence of the experimental cuts on the integrated cross section and on various differential distributions for outgoing particles. Distributions in rapidities and transverse momenta of outgoing protons and pions as well as correlations in azimuthal angle between them are presented. We find that the relative contribution of resonant $f_2(1270)$ and dipion continuum strongly depends on the cut on proton transverse momenta (or four-momentum transfer squared $t_{1,2}$) which may explain some controversial observations made by different ISR experiments in the past. The cuts may play then the role of a $\pi\pi$ resonance filter. We suggest some experimental analyses to fix model parameters related to the pomeron-pomeron-meson coupling.

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