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Pseudoscalar meson-pair production beyond the resonance region at COMPASS

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The COMPASS experiment at CERN's SPS provides a very large data set to study the light-meson spectrum in diffractive production reactions of 190 GeV/c beam pions with protons. Among the many different final states accessible, $\eta\pi^-$ and $\eta'\pi^-$ are clean channels to investigate the lightest hybrid-meson candidate, the $\pi_1(1600)$. One challenge in the extraction of resonance parameters, like pole positions, is the separation of resonant and non-resonant processes.

To better constrain the non-resonant production mechanism of these final states, we analyze the high-mass region, i.e. $4\,\mathrm{GeV/c^2} < m_{\eta^{(\prime)}\pi^-} < 6\,\mathrm{GeV/c^2}$, using the double-Regge exchange model by Shimada er al., [Nucl. Phys. B 142 (1978)]. The model describes the dependence of the amplitude of a given double-Regge exchange on the invariant variables in terms of Regge trajectories. In addition, form factors are introduced at every vertex to parameterize the t-dependence of the coupling. We perform an event-based likelihood fit to the full COMPASS data set and show that the high-mass data can be described by only 13 parameters.

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