

# $\eta' - \pi$ production and search for exotic mesons at COMPASS and JLab12

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## Collaboration

## Abstract content

In a recent analysis of the exclusive production of  $\eta - \pi$  and  $\eta' - \pi$  meson systems with a 191 GeV/c pion beam on a proton target at COMPASS, an unexpected enhancement of  $\eta' - \pi$  over  $\eta - \pi$  was observed for the odd partial waves. These carry exotic quantum numbers therefore cannot be associated with the conventional quark-antiquark states. The collected data covers a wide range of the dimeson invariant masses extending to the region where the multi-particle production process enters the diffractive regime and can be well described by means of the theory of complex angular momentum, namely in terms of the  $t$ -channel exchanges of Regge trajectories. Assuming the analyticity and the multi-Regge behavior of the scattering amplitude at high energies, the finite energy sum rules for multiple production can be formulated. The sum rules give a consistency condition between a quasi-two-body Regge amplitude and a double Regge amplitude in the case of reactions with three particles in the final state. Such conditions allow to examine the analytical structure of the multi-particle production amplitudes and to shed light on the observed  $\eta - \pi$  puzzle.

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