

Search for the $\pi_1(1600)$ in the $\rho\pi$ decay channel:
**New results on diffractive dissociation into $\pi^-\pi^0\pi^0$ final state at
COMPASS, and comparison to the charged decay mode**

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The COMPASS experiment at the CERN SPS features good charged particle tracking and coverage by electromagnetic calorimetry, and our data provide excellent opportunity for simultaneous observation of new states in two different decay modes within the same experiment. The existence of the spin-exotic $\pi_1(1600)$ resonance in the $\rho\pi$ decay channel is studied for the first time in COMPASS in both decay modes of the diffractively produced $(3\pi)^-$ system: $\pi^-p \rightarrow \pi^-\pi^0\pi^0p$ and $\pi^-p \rightarrow \pi^-\pi^+\pi^-p$. A preliminary partial-wave analysis performed on the 2008 proton target data allows for a first conclusive comparison of both $(3\pi)^-$ decay modes not only for main waves but also for small ones, including the spin-exotic 1^{-+} wave. We find the neutral versus charged mode results in good agreement with expectations from isospin symmetry. Both, the intensities and the relative phases to well-known resonances, are consistent for the neutral and the charged decay modes of the $(3\pi)^-$ system. The status on the search for the spin-exotic $\pi_1(1600)$ resonance produced on a proton target is discussed.

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