A Partial-wave Analysis of $\pi^-\pi^0\pi^0$ Events Produced in $\pi^- p$ Collisions at $18\,\mathrm{GeV/c}$

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Abstract

A partial-wave analysis of the reaction $\pi^-\mathrm{p} \to \pi^-\pi^0\pi^0$ at $18\,\mathrm{GeV/c}$ has been performed on a data sample of $135,000$ events obtained during the 1994 data run of experiment E852 at BNL. We report that the exotic $J^{PC} = 1^{-+}$ wave, produced in natural parity exchange, shows resonance-like behavior in both its mass spectrum and phase motion around $1.6\,\mathrm{GeV/c^2}$. Although statistics are limited, the mass spectrum of the 1^{-+} signal in unnatural parity exchange exhibits a shape similar to its counterpart in natural parity exchange.