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Discerning the two $K_1(1270)$ poles in $D^0 \rightarrow \pi^+ VP$ decay

Within the chiral unitary approach, the axial-vector resonance $K_1(1270)$ has been predicted to manifest a two-pole nature.

The lowest pole has a mass of 1195 Mev and a width of 246 Mev and couples mostly to $K^*\pi$, and the highest pole has a mass of 1284 Mev and a width of 146 Mev and couples mostly to ρK . We analyze theoretically how this double-pole structure can show up in the $D^0 \rightarrow \pi^+ VP$ decays by looking at the vector-pseudoscalar (VP) invariant mass distribution for different VP channels, exploiting the fact that each pole couples differently to different VP pairs.

We find that the final $\bar{K}^*\pi$ and $\rho\bar{K}$ channels are sensible to the different poles of the $K_1(1270)$

resonance and hence are suitable reactions to analyze experimentally the double pole nature of this resonance.

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