

# The role of $\rho - \omega$ interference in semileptonic $B \rightarrow \pi^+ \pi^- \ell \bar{\nu}_\ell$ decays

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It is long known that interference effects play an important role in understanding the shape of the  $\pi^+ \pi^-$  spectrum of resonances near the threshold. In this manuscript, we investigate the role of the  $\rho - \omega$  interference in the study of semileptonic  $B \rightarrow \pi^+ \pi^- \ell \bar{\nu}_\ell$  decays. We determine for the first time the strong phase difference between  $B \rightarrow \rho \ell \bar{\nu}_\ell$  and  $B \rightarrow \omega \ell \bar{\nu}_\ell$  from a recent Belle measurement of the  $m_{\pi\pi}$  spectrum of  $B \rightarrow \pi^+ \pi^- \ell \bar{\nu}_\ell$ . In addition, we investigate different ways of modelling the  $S$ -wave component within an  $m_{\pi\pi}$  window ranging from  $2m_\pi$  to 1.02 GeV. We also determine the absolute value of the Cabibbo-Kobayashi-Maskawa matrix element of  $|V_{ub}|_{\rho-\omega} = (3.03^{+0.49}_{-0.44}) \times 10^{-3}$ , which takes into account the  $\rho - \omega$  interference.

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