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Test the molecular picture of the X(3872) in $\bar{B}_{(s)} \to \bar{K}^{(*)}(\eta, \eta', \phi)X$ decays

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We study the decays $\bar{B}^0 \to \bar{K}^0 X$, $B^- \to K^- X$, $\bar{B}_s^0 \to \eta(\eta') X$, $\bar{B}^0 \to \bar{K}^{*0} X$, $B^- \to K^{*-} X$, $\bar{B}_s^0 \to \phi X$, with $X \equiv X(3872)$, from the perspective of the $X(3872)$ being a molecular state made from the interaction of the $D^{*+}D^-$, $D^{*0}\bar{D}^0$ and *c.c.* components. We consider both the external and internal emission decay mechanisms and find an explanation for the $\bar{K}^0 X$ and $K^- X$ production rates, based on the mass difference of the charged and neutral $D^*\bar{D}$ components. We also find that the internal and external emission mechanisms add constructively in the $\bar{B}^0 \to \bar{K}^0 X$, $B^- \to K^- X$ reactions, while they add destructively in the case of $\bar{B}^0 \to \bar{K}^{*0} X$, $B^- \to K^{*-} X$ reactions. This feature explains the decay widths of the present measurements and allows us to make predictions for the unmeasured modes of $\bar{B}_s^0 \to \eta(\eta') X(3872)$ and $B^- \to K^{*-} X(3872)$. The future measurement of these decay modes will help us get a better perspective on the nature of the $X(3872)$ and the mechanisms present in production reactions of that state.

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