

Searching for detectable effects induced by anomalous threshold singularities

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We investigate the possibilities of detecting the kinematic singularities, especially the anomalous threshold triangle singularity, in the current experimental facilities. In some special kinematic configurations, the discrepancy between normal and anomalous thresholds can be large, which may provides us with a criterion to distinguish threshold effects from molecular states interpretations for some XYZ particles. The bottomed meson decay mode $B \rightarrow K \bar{K}^* \bar{D}^{(*)} \rightarrow K D_s^{(*)-} \pi \pi$, as displayed in Figure 1, is found to be a promising rescattering process to study the anomalous threshold singularities. Because of the anomalous threshold singularities in the rescattering amplitude and the very narrow widths of charm-strange mesons, the processes $e^+e^- \rightarrow \gamma J/\psi \omega$, $\gamma J/\psi \phi$ and $\pi J/\psi \eta$, where the center of mass energy is around the $D_{s0}(2317)D_s^*$ ($D_{s1}(2460)D_s^{(*)}$) threshold, are found to be very suitable processes to search for $X(3915)$, $Y(4140)$ and their charge conjugate partners. This study may also offer us another possibility to understand those "resonance-like" XYZ particles observed in recent years.

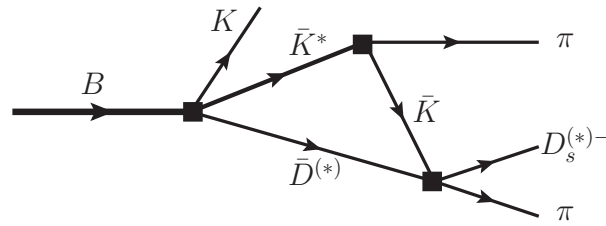


Figure 1: Rescattering process in B decays.