Abstract

Hadron spectroscopy, in particular, due to the appearance of the so-called XYZ particles, is experiencing a renaissance in recent years. Concerning the underlying structures of those XYZ states, besides the genuine resonances interpretations, some non-resonance interpretations which connect the kinematic singularities of rescattering amplitudes with the resonance-like peaks were also proposed in literatures, such as the triangle singularity mechanism. Before claiming that a resonance-like peak corresponds to a genuine particle, it is also necessary to exclude or confirm the possibility of the non-resonance interpretation. We investigate the process $B_c^+ \rightarrow B_s^0 \pi^+ \pi^0$ via $B \bar{K}^*$ rescattering. The kinematic conditions for triangle singularities are perfectly satisfied in the rescattering diagrams. A resonance-like structure around the $B \bar{K}$ threshold, which we denote as X(5777), is predicted to be present in the invariant mass distribution of $B_s^0 \pi^+ \pi^0$. Because the relative weak $B \bar{K}$ (I=1) interaction does not support the existence of a dynamically generated hadronic molecule, the X(5777) can be identified as a pure kinematical effect due to the triangle singularity. Its observation may help to establish a non-resonance interpretation for some XYZ particles.