Contribution ID: **4** Type: **not specified**

From topological amplitude to rescattering dynamics

We proposed a theoretical framework to correlate the topological diagram at quark level and rescattering dynamics at hadron level.
In this framework, both the hadronic triangle diagram, and the quark diagram, which is the intermediate form between topological diagram and triangle diagram, are expressed in the tensor form.
The coefficient of each triangle diagram can be derived from the quark diagram.
The completeness of the quark diagram is confirmed by the quark substructure meson-meson scattering.
Taking $D \to K\pi$ and $D \to \pi\pi$ decays as examples, we present our framework in detail.
We find the total long-distance amplitudes extracted from quark diagrams are consistent with the ones derived from the chiral lagrangian.
The Isospin relations in the $D \to K\pi$ and $D \to \pi\pi$ decays are kept in terms of triangle diagram.
Under the $SU(3)_F$ symmetry, the long-distance contributions in the C, E and T^{LP} diagrams have definite proportional relation, $L(C) : L(E) : L(T^{LP}) = -2 : 1 : 1$.
If the $SU(3)_F$ symmetry breaks into the Isospin symmetry, this relation is broken.
The long-distance contributions in the T and A diagrams are only arisen from the $SU(3)_F$ breaking effects.
And there are no triangle diagram like long-distance contributions in other topologies.
Besides, the conclusions about the D meson decays under the $SU(3)_F$ symmetry can be generalized to the B meson decays under the $SU(4)_F$ symmetry.

Presentation type

Oral

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