Contribution ID: **202** Type: **Talk**

# Charm rescattering contribution to charmless three-body B decays

*Wednesday 27 September 2017 12:40 (20 minutes)*

Experimental results on three-body charmless non-leptonic B decays have shown a considerable amount of direct CP asymmetry localized in specific regions of the Dalitz plot. In the low hadron-hadron mass region, we recently showed that the final state interactions (FSI) play a very important role, providing through $\pi\pi \to KK$ rescattering the strong phase difference needed for direct CP violation.

In the present work we investigate the possibility of $B \to D\bar{D}P$ ($P = \pi, K$) decays to contribute for charmless three-body B decays.
This could be possible through a rescattering of $DD \to PP$, where P are light pseudoscalars, which could produce the strong phase one need to explains the CP violation at high hadron-hadron masses.
A possible suppression of the $D\bar{D} \to PP$ rescattering would be compensated by the much larger branching fractions of $B \to D\bar{D}P$ decays,
which might also leave a signature in the Dalitz plot.

There are two kinds of weak topologies that can generate the intermediate double charm state in B charmless decay: the vector ones $B^+ \to D^{*+}_{(s)}\bar{D}^0$, and the axial $B^+ \to D\bar{D}P$.
The vector topology gives rise to a triangle hadronic loop that has been investigated within different contexts and is also called charm penguin contribution. Hadronic loops contribute to the class of three-body final state interactions, since the momentum is shared between all the particles in the final state. On the other hand, the axial contribution is restricted to (2 + 1) FSI and is proportional to a bubble loop. Both processes are proportional to rescattering amplitude $D\bar{D} \to PP$ and will contribute to a nonresonant amplitude. Our studies show that these two possible contributions have clear signatures in the Dalitz plot which could give some hints of the importance of this kind of final state interaction in those decays.

Initially we focus our study in the $B^+ \to K^-K^+K$ decay in which the vector topology is given by $B^+ \to D_s^{*+}\bar{D}^0$ whereas axial one is given by $B^+ \to D^0\bar{D}^0K^+$.
In order to calculate the hadronic decays amplitude in either topologies, one need the rescattering amplitude $\bar{D}^0D^0 \to K^+K^-$, which was built inspired by a phenomenological approach considering the dumping factor of the S-matrix, in a similar way that was done previously to $\pi\pi \to KK$.

**Primary authors:** MAGALHAES, Patricia (CBPF - Brazilian Center for Physics Research (BR)); Prof. DE BEDIAGA HICKMAN, Ignacio (CBPF - Brazilian Center for Physics Research (BR)); FREDERICO, Tobias (Instituto Tecnologico de Aeronautica)

**Presenter:** MAGALHAES, Patricia (CBPF - Brazilian Center for Physics Research (BR))

**Session Classification:** Hadron decays

**Track Classification:** Hadron decays