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## D mixing in multi-body decays

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Although mixing in neutral K and B systems has long been established, mixing in neutral D mesons has only recently been observed. In fact, in 2012 LHCb published the first single observation of D mixing in  $D^0 \rightarrow K^- \pi^+$  decays.

LHCb has now collected enough data to study D mixing in multi-body D decays such as  $D^0 \rightarrow K^+ \pi^- \pi^0$  and  $D^0 \rightarrow K^+ \pi^- \pi^+ \pi^-$ . Whilst these decay modes do not necessarily provide as much sensitivity to mixing, they provide us with another exciting opportunity.

D mixing results in a time dependent superposition of  $D^0$  and  $\bar{D}^0$  states. This superposition is defined by the dimensionless mixing parameters  $x$  and  $y$ . With knowledge of  $x$  and  $y$  from other analyses, we can now use D mixing to investigate the interference effects between  $D^0$  and  $\bar{D}^0$  amplitudes, including information on their relative phase.

In particular, one can constrain the coherence factor,  $R_{K\pi\pi\pi}$ , and average strong phase difference  $\delta_{K\pi\pi\pi}$ . These two parameters provide important input to extracting the CP violating phase  $\gamma$  in  $B^\pm \rightarrow DK^\pm$  decays.

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