Expanding Model Independent Approaches for Measuring the CKM angle $\gamma$ at LHCb

Claire Prouve, on behalf of the LHCb collaboration
University of Bristol

**Measurement of CKM angle $\gamma$ through interference in $B^+ \to D^- f_D K^+$**

\[
\frac{d\Gamma}{dt} = \frac{1}{4} f_{B^+} f_{D^-} f_{K^+} f_D^* f_K^* \left| A_{CP}(\bar{B}^+) \right|^2 \delta(t)
\]

\[
\delta(t) = \delta(t_\text{CP}) + \delta(t_\text{SU(3)}) + \frac{1}{2} \delta(t_\text{SU(2)}) + \frac{1}{4} \delta(t_\text{SU(1)}) + \delta(t_\text{NP})
\]

**Binned phase-space for the $D$ decay**

- $B \to D^0 K^+$
- $B \to D^- K^+$

**Partial decay width**

- $B \to D^0 K^+$
- $B \to D^- K^+$

**Correlated CLEO-c**

- Most precise measurement from single analysis
- LHCb: $\gamma = 62^{+14}_{-9}^\circ$

**Future prospects**

- Self-conj. state $\to$ GGSZ
- Expect gain from binned analysis
- $5k B^\pm \to D(\to 4\pi) K^\pm$ events after reconstruction and selection 2015 + 2016
- 5-dimensional phase-space $\to$ adaptive binning
- Similar sensitivity to $\gamma$ as from $D \to K^0 \pi^+ \pi^-$

**D $\to K^0 \pi^+ \pi^-$**

- ADS mode
- $10\times$ higher BR than $D \to \pi^+ \pi^- \pi^-$
- Possible further input:
  - BESIII
  - LHCb $D^0-D^0$ mixing

Toy simulation with expected LHCb statistics at the end of Run II: $\sigma(\gamma) \sim 9^\circ$