Update on $B^{\pm} \to Dh^{\pm}$, $D \to K^+K^-\pi^+\pi^-$ analysis at LHCb and BESIII

Martin Tat

Oxford LHCb

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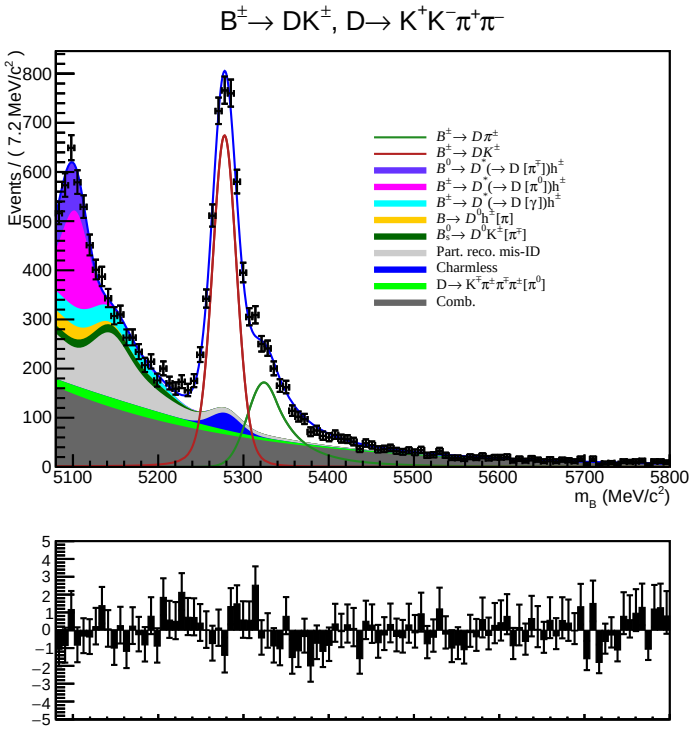
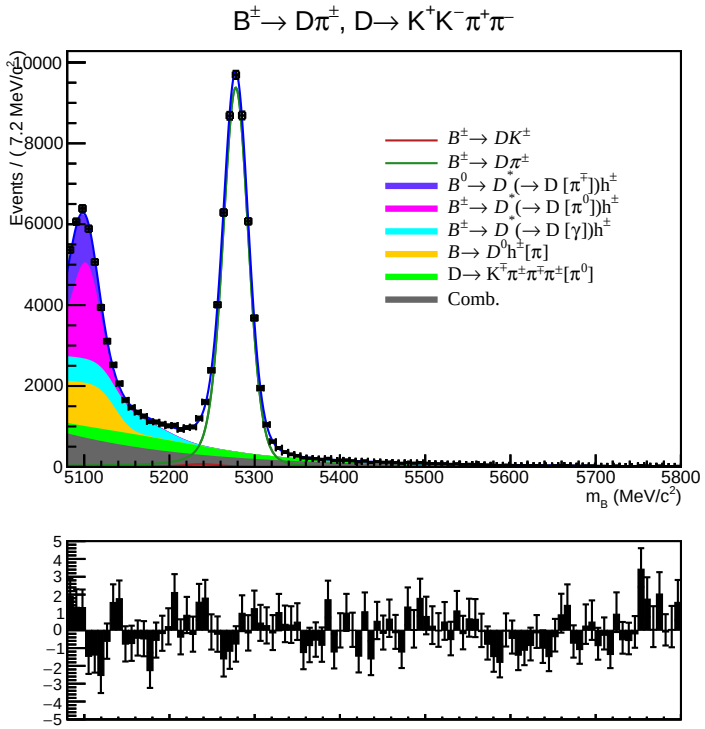
Outline

1. LHCb
   - Summary of current LHCb analysis progression
2. BESIII
   - Strong-phase determination in quantum correlated $D^0\bar{D}^0$ decays
   - First look at binned fits: Measurement of fractional bin yields K_i
   - Measurement of CP-even fraction F_+
3. Summary and conclusion

LHCb analysis summary

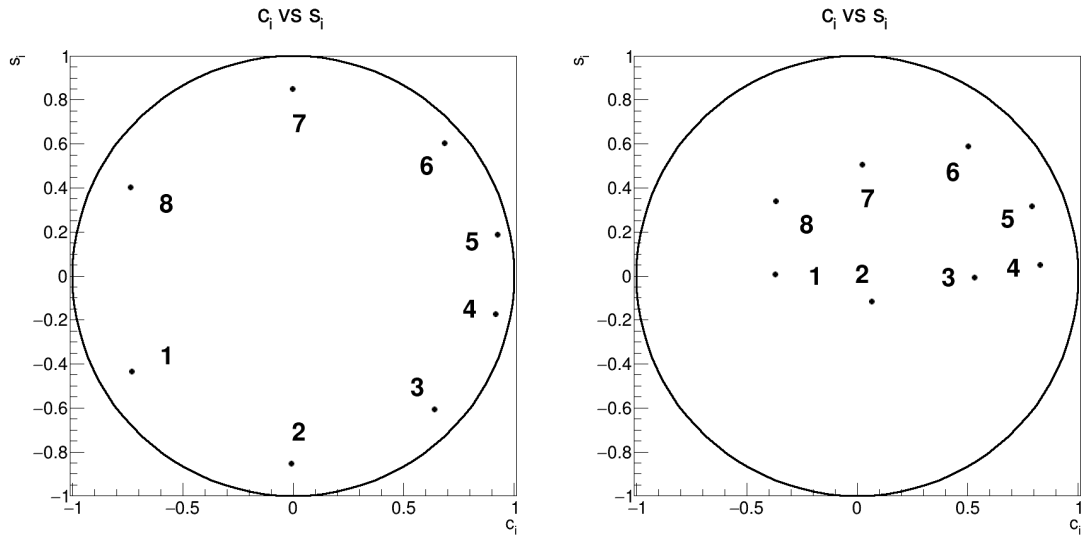
- Previous report on $B^{\pm} \to Dh^{\pm}$, $D \to K^+K^-\pi^+\pi^-$:
  1. Global mass fit $\implies$ Obtain mass shape
  2. Binned CP fit $\implies$ Obtain CP observables
  3. Backgrounds: Charmless, $D \to K\pi\pi\pi^0$, $D \to K\pi\pi\pi$, $D \to K(X)l\nu$
  4. Systematic uncertainties: Mostly c_i, s_i





LHCb analysis summary

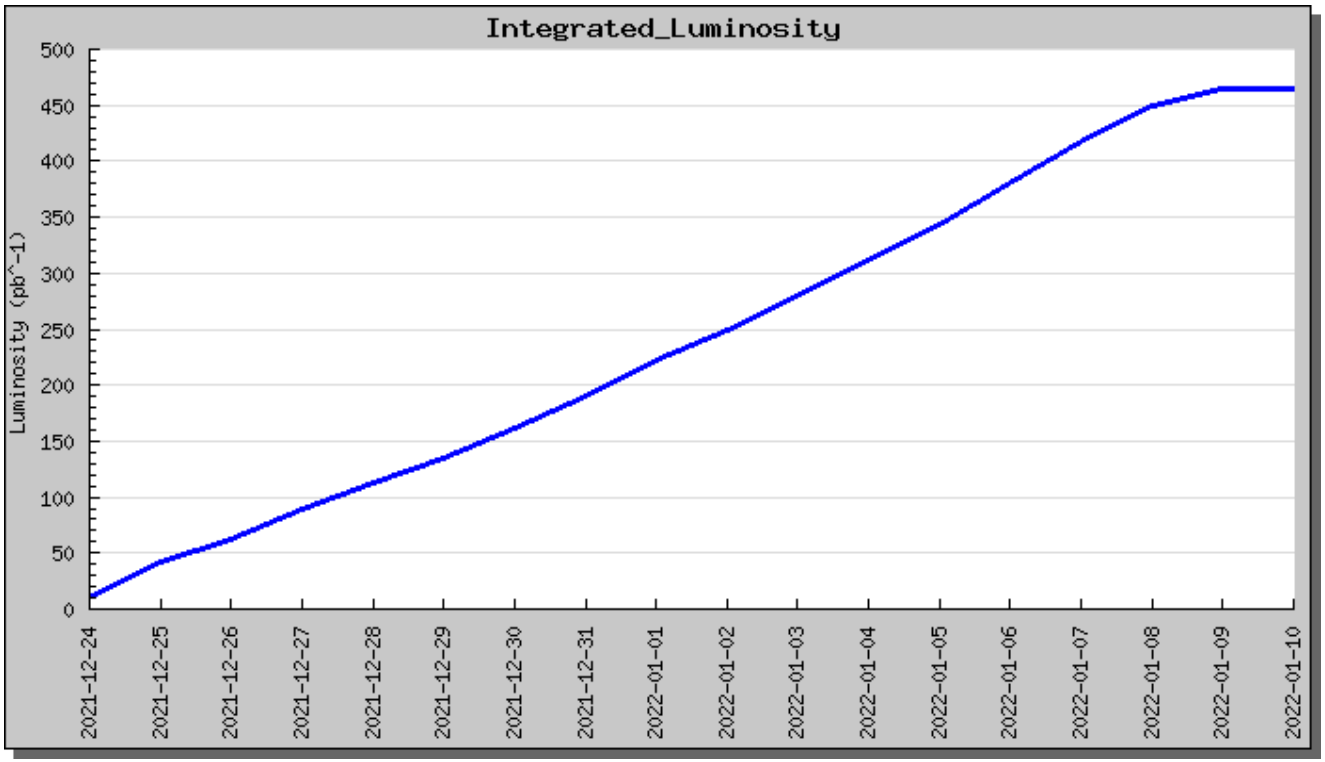
- Current analysis progress:
  1. Finished ANA note draft, currently in 1st circulation in B2OC WG
  2. Received comments from 2/3 reviewers, replies ready this week
     - Will request $B \to (K\pi\pi\pi^0)_D h^\pm$ MC
     - Fit with c_i, s_i floated?
  3. Need to finish off systematics for:
     - Charmless and $K\pi\pi\pi^0$ backgrounds
     - c_i, s_i model-dependent uncertainties



(a) LHCb model **(b)** CLEO model

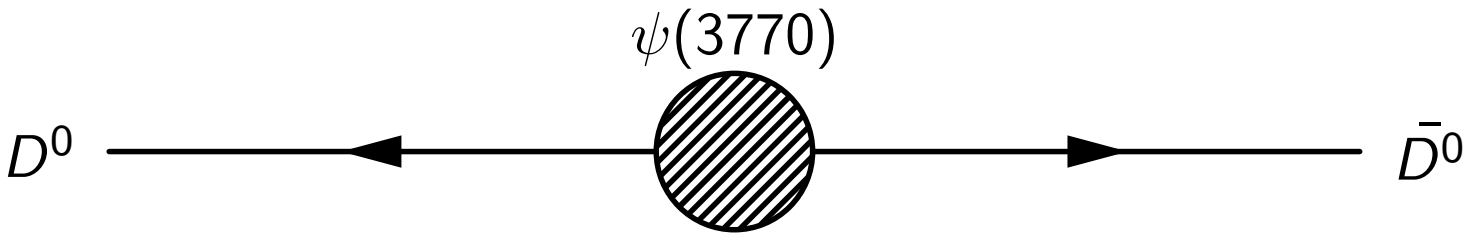
Strong-phase determination in quantum correlated $D^0\bar{D}^0$ decays

- BESIII: e^+e^- collider at $\psi(3770) \to D^0\bar{D}^0$ threshold
  - 2010-2011: $2.93\,\text{fb}^{-1}$
  - Since 23rd December: $0.46\,\text{fb}^{-1}$
  - Expect $20\,\text{fb}^{-1}$ by end of 2023

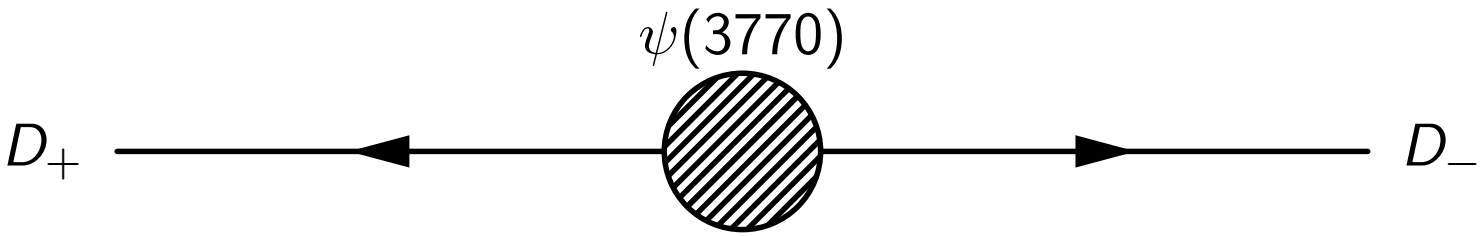


Strong-phase determination in quantum correlated $D^0\bar{D}^0$ decays

- $D^0\bar{D}^0$ pair is quantum correlated



- Equivalently, we can consider D_+D_-
  - $D_\pm = \frac{1}{\sqrt{2}}(D^0 \pm \bar{D}^0)$ are CP eigenstates



Summary and conclusion

Summary of CP observables