Flavour-tagged time-dependent angular analysis of the $B_s \to J/\psi\Phi$ decay with ATLAS

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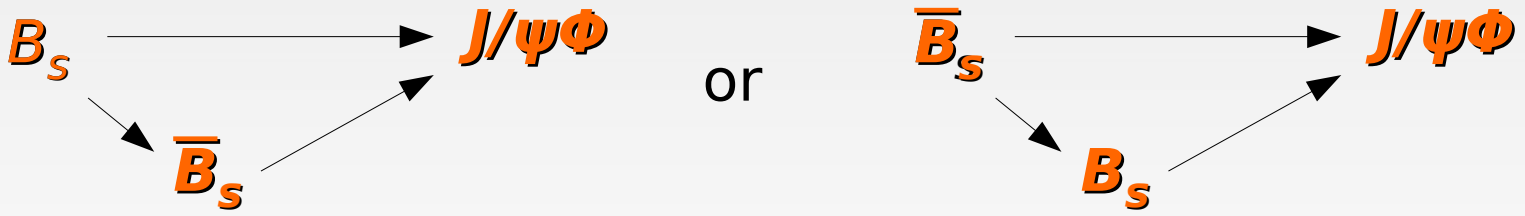
FZÚ

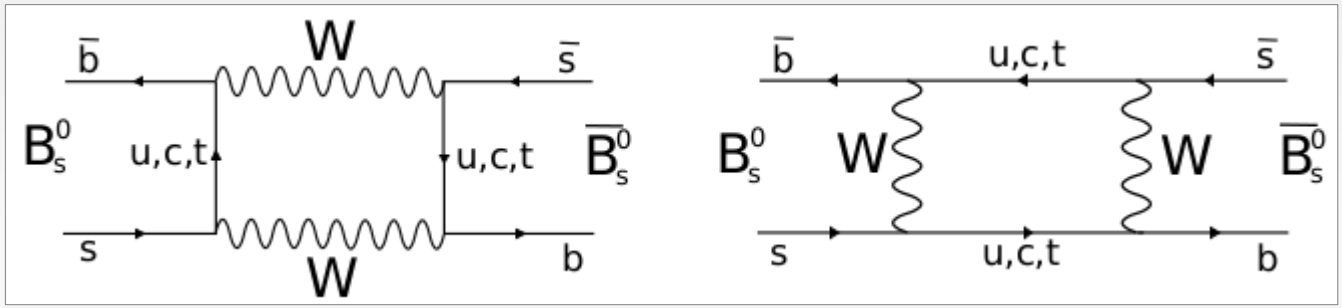
Motivation: *CP* Violation in $B_s \to J/\psi\Phi$

- To distinguish between different *CP* violating effects three categories are defined:
  - **CP violation in decay**: decay amplitudes of *B*-meson and anti *B*-meson are different
  - **CP violation in mixing**: asymmetry in the particle antiparticle oscillations (*CP* eigenstates are not equivalent to the mass eigenstates)
  - in the $B_s \to J/\psi\Phi$ channel the *CP* violation occurs in **interference of mixing and decay**:



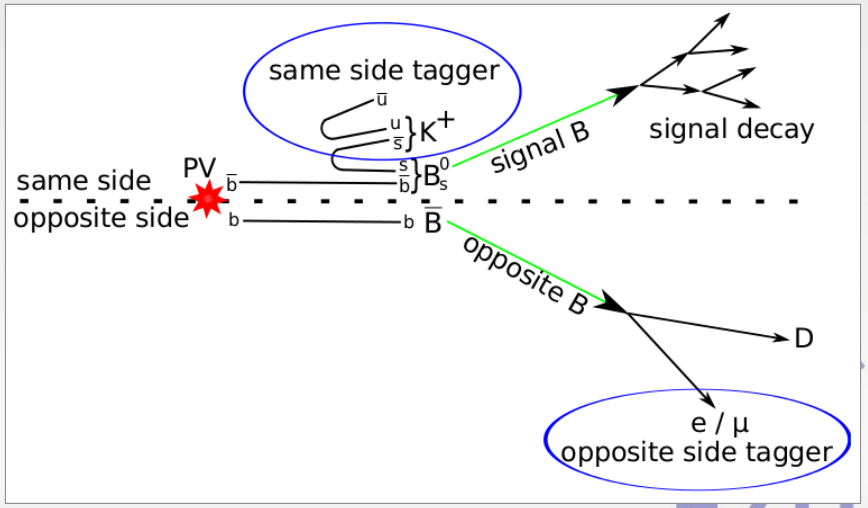
Motivation: New Physics

- Phase $\Phi_s \approx -2\beta_s = -2\arg[(V_{ts}V_{tb}^*)/(V_{cs}V_{cb}^*)]$
- $\Phi_s = -0.037 \pm 0.002$ rad in the Standard Model (SM)
- A sizable deviation from this value would be a clear sign of beyond SM physics
- $\Delta\Gamma_s$ is not sensitive to New Physics, but can be used to test theoretical predictions
- The New Physics processes could introduce additional contributions to the box diagrams describing the B_s mixing



Analysis

- $B_s \to J/\psi\Phi$: pseudo-scalar to vector–vector meson decay
- *CP*-even ($L = 0, 2$) and *CP*-odd ($L = 1$) in final state
- Distinguishable through time-dependent angular analysis
- Flavour-tagging:
  - At the LHC *B*-mesons are produced in the hadronization of $b\bar{b}$ pair
  - Same side vs. **opposite side taggers (OST)**
  - Self-tagging $B^{\pm} \to J/\psi K^{\pm}$ for calibration and performance estimation
  - Muon and Jet-charge tagging
- Unbinned maximum likelihood fit (m, t, p_T, tag, angles)



Summary of results

- Decay parameters describing the Bs → J/ψφ are measured from data sample of 4.9 fb-1 7 TeV pp collisions, collected with the ATLAS detector in 2011
- The results are consistent with prediction from the SM