

XJ/ψ Update



Paper aims:

Core results:

- Branching fractions of $B \rightarrow J/\psi X$ (prompt + non-prompt) for B , B^\pm , B^0
 - ▶ Extract signal yields via fitting $m_{\ell\ell}$ distribution.
- Partial branching fractions as a function of m_X , $\cos\theta_\ell$, p_X , $p_{J/\psi}$
 - ▶ Need to unfold migrations, simple χ^2 matrix inversion should be good enough. No work happened on this yet.

Non-core results:

- Partial branching fractions as a function of N_{K^+} , N_{π^\pm} (only if there is time?)
- Asymmetry measurement? $\mathcal{A} = \frac{\Gamma - \bar{\Gamma}}{\Gamma + \bar{\Gamma}}$ (only if there is time and using the tag flavor?)

Note: <https://stash.desy.de/projects/B2D/repos/belle2-note-ph-2020-018/browse/>

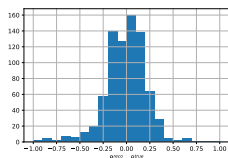
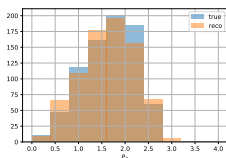
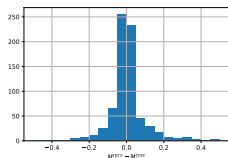
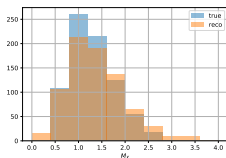
Custom variables in:

https://stash.desy.de/projects/B2A/repos/sutclw_b_sll_bonn/browse and basf2 pathbuilder in feicalib package:

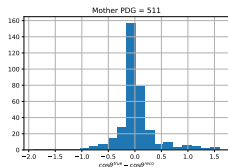
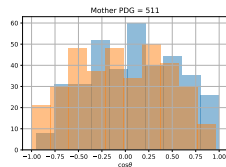
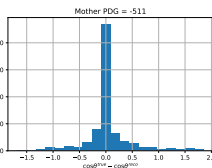
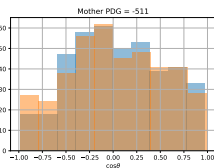
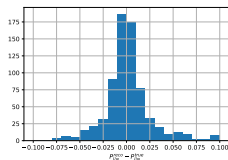
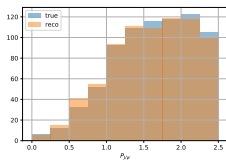
<https://stash.desy.de/users/sutclw/repos/feicalib/browse/feicalib>

First results

- Implemented truth variables for a number of kinematic variables M_X , P_X , $P_{J/\psi}$ and $\cos\theta$.
- Look at the resolution with $B^0 \rightarrow X_{s\ell\ell}$ decays. Sig Prob > 0.01 , $M_{bc} > 5.27$, leptons truth matched as leptons



First results



Next steps

- Process samples
 - ▶ 100-200 fb⁻¹ generic + continuum
 - ▶ data will use 74 fb⁻¹, start with 34.6 fb⁻¹
- Fits to $M_{J/\psi}$ in bins of M_X , $\cos\theta_\ell$, p_X , $p_{J/\psi}$
 - ▶ Fits in MC to demonstrate closure, throw toys
 - ▶ Fits already to the data side band
- Apply PID corrections + tagside corrections and do a data - MC comparison (Will)
- Efficiency
 - ▶ Use MC to determine the efficiency.
 - ▶ Evaluate systematics: tracking 0.8², PID, tagging, MC stat
- Fits of $M_{J/\psi}$ in other kinematic distributions? θ , $p_{J/\psi}$, m_X
- Unfolding code needs to be written (χ^2), migration matrices need to be obtained.
- Other systematics: Fit shapes (spurious signal? bkg parametrization), XJ/ψ composition in MC