

Search for the rare decays $B \rightarrow K\nu\bar{\nu}$ at Belle II

Group Meeting - B2Knunu

Merna AbuMusabh, Giulio Dujany, Corentin Santos

Institut Pluridisciplinaire Hubert Curien
University of Strasbourg

29 November 2024



Table of Contents

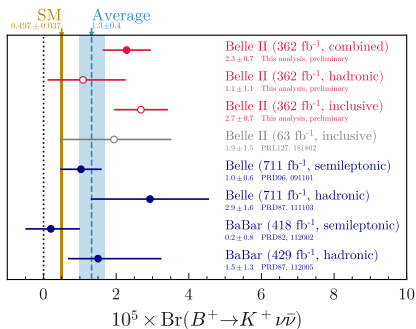
1 November 29, 2024

1 November 29, 2024

State of the art

State of the art:

- Analyses carried at Belle II for Hadronic Tagged Analysis (HTA), Inclusive Tagged Analysis (ITA) and combined
- Decay channel: $B^+ \rightarrow K^+ \nu \bar{\nu}$
- Results: evidence for 2.7σ above the SM expectation from combined analysis



Main goal

- Carry the same analysis for the Semileptonic Tagged Analysis (STA)
- Compare the results on $B^+ \rightarrow K^+ \nu \bar{\nu}$ with STA for consistency check
- Will also do the analysis for one of the $B \rightarrow K^* \nu \bar{\nu}$ channel

First approach

- Very similar to HTA since exclusive analysis
 - Will use *semileptonic* FEI instead of hadronic
 - Important variables for HTA: ΔE and M_{bc}
- Important variable for STA: $\cos(\theta_{BY})$

Quests

Main quests:

1. Take the previous workflow, understand it and automatize it using B2LUIGI (95% done)
2. Adapt the workflow to the STA (partly done by Jacopo)
3. Change the FEI corrections to semileptonic (for cross-check with respect to embedded)
4. Change the corrections to run dependent

Side quests:

1. Switch the plots from homemade functions to PLOTHIST
2. Change computation of uncertainties to **more standardized way** → will use **SYSVAR** or **PYHFCORR**
3. Check **CABINETRY** for management of PYHF fits

Current tasks

Active quests:

1. Take the previous workflow, understand it and automatize it using B2LUIGI (95% done)
2. Adapt the workflow to the STA (partly done by Jacopo)
3. Change the PID corrections to run dependent
4. Test the new workflow with and without the Tree Fitter
5. Try $\Upsilon(4S)$ vertex fitting with TWINB

Git repositories

Gitlab repository:

