

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

Group Meeting - B2Knunu

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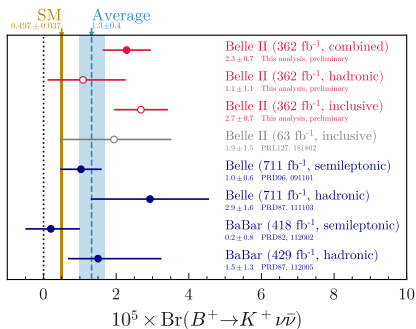
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State of the art

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. Test the new workflow with and without the Tree Fitter

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)
 - Change the FEI corrections to semileptonic (for cross-check with respect to embedded)
 - Change the corrections to run dependent
3. Test the new workflow with and without the Tree Fitter
 - Try $\Upsilon(4S)$ vertex fitting with TWINB

Git repositories

Gitlab repository:

