

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

Group Meeting - B2Knunu

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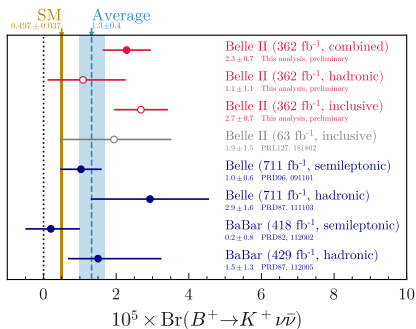
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# State of the art

## 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  $2.7\sigma$  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:  $\Delta E$  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 FEI corrections to semileptonic (for cross-check with respect to embedded)
4. Change the corrections to run dependent
5. Test the new workflow with and without the Tree Fitter
6. Try  $\Upsilon(4S)$  vertex fitting with **TWINB**



# Git repositories

**Gitlab repository:**

