

# B flavor and time-dependent CP violating measurement with Belle II

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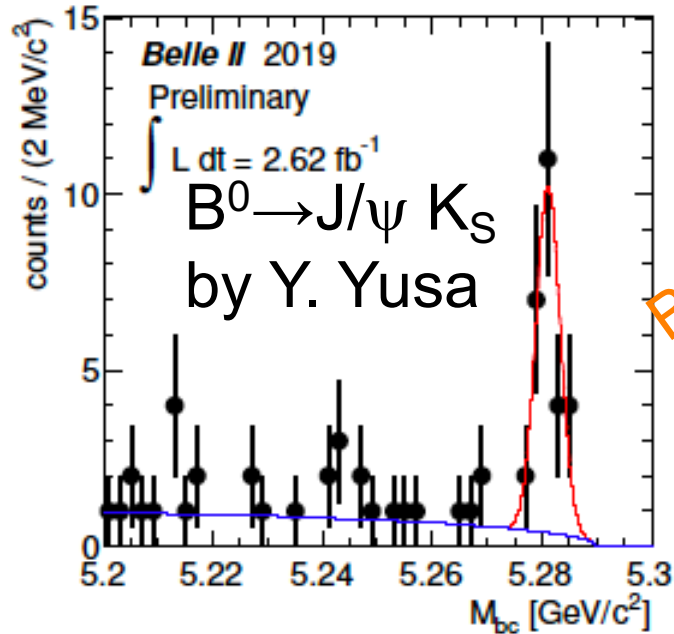
for TYL 2020 review

2020 Apr. 10<sup>th</sup>

# Academic exchanges

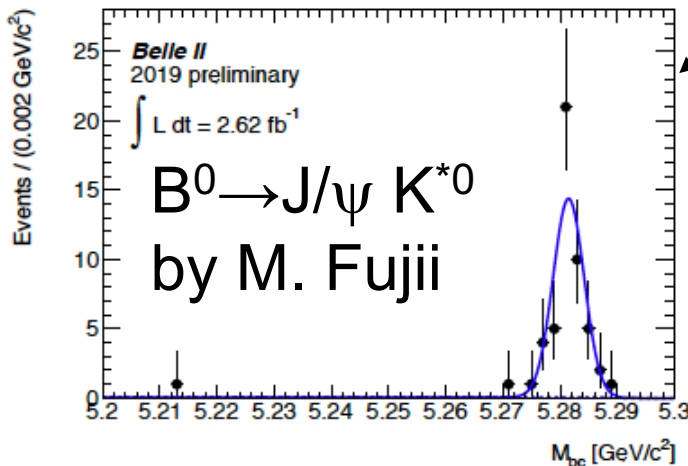
- R. Rasheed (Strasbourg) stayed at Nagoya in 2019 spring to work together with Alessandro Gaz.
  - She became capable to perform the fit to  $\Delta t$  distribution with an initial simple vertex resolution model.
- K. Miyabayashi, M. Fujii (Nara) and Y. Yusa (Niigata) visited Strasbourg in 2019 Dec.
  - Very detailed review discussion of the vertex resolution function developed at Belle.
  - Analysis activities with early Belle II data reviewed each other. Activity future extensions are discussed.
- During 2020, Tristan Fillinger (Strasbourg) plan to visit Nara after COVID-19 pandemic cured.

# Rediscoveries, $\Delta t$ measurement

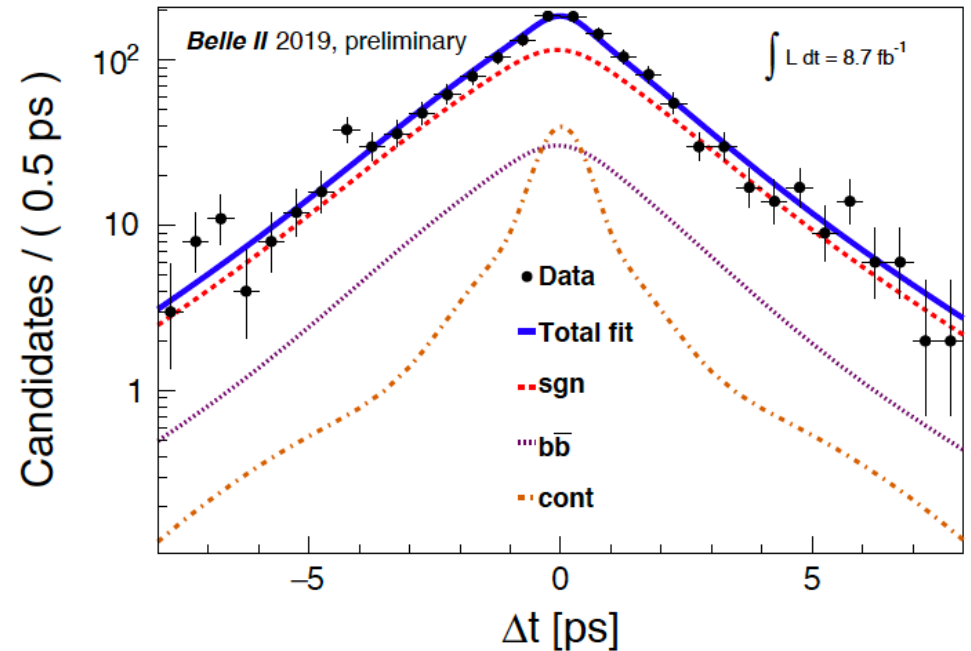


*Belle II preliminary*

Shown at LP19



$B^0 \rightarrow D^{(*)-} \pi^+, D^{(*)-} \rho^+$   
 by R. Rasheed

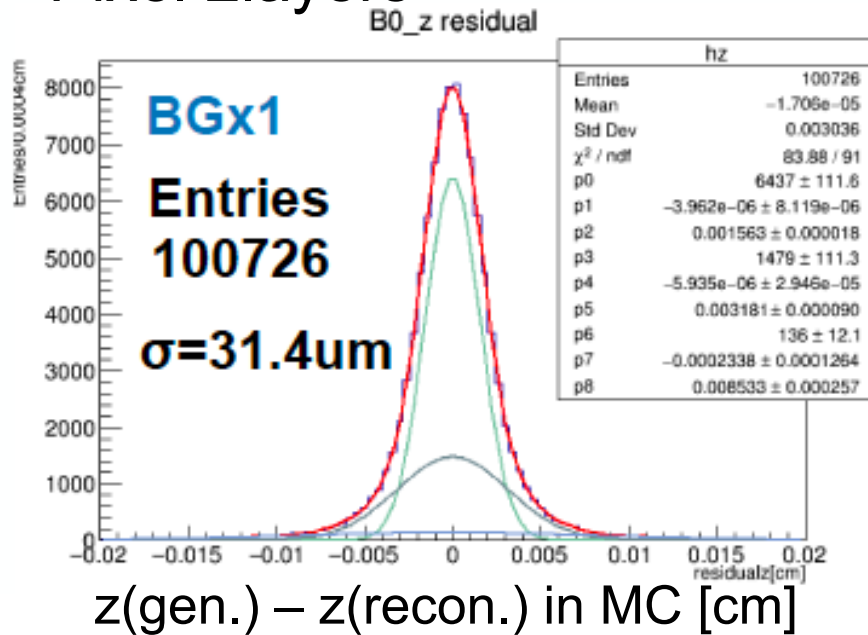


$\tau_{B^0} = 1.48 \pm 0.28 \pm 0.05 \text{ ps}$   
 Consistent with W.A., demonstrating  $\Delta t$  measurement capability.  
 Conference paper to be public soon.

# Preparing for future high luminosity

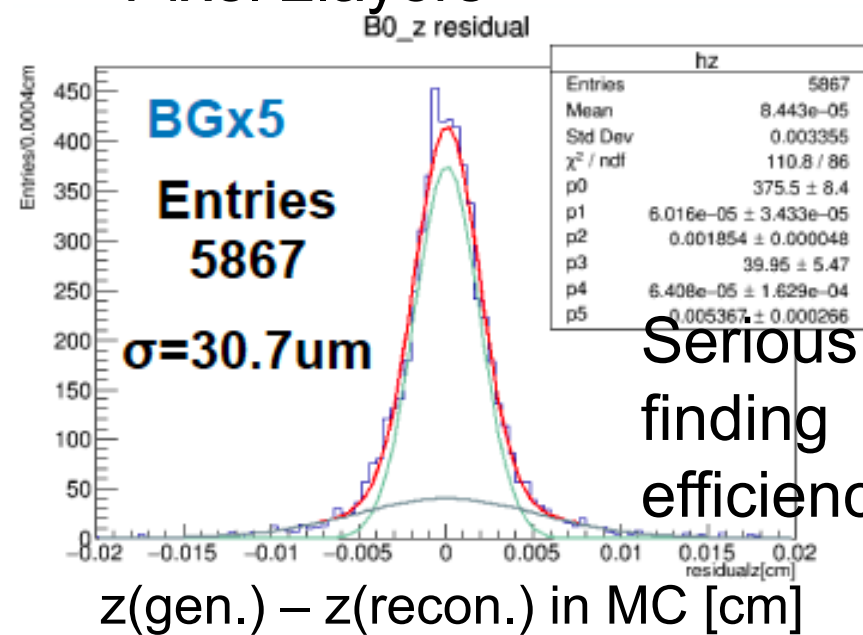
$L=8 \times 10^{35} \text{cm}^{-2}\text{s}^{-1}$  (design)

Pixel 2layers



$L=4 \times 10^{36} \text{cm}^{-2}\text{s}^{-1}$  (design × 5)

Pixel 2layers



Serious track finding efficiency drop.

Using  $B^0 \rightarrow J/\psi K_S$  and  $B^0 \rightarrow J/\psi K^{*0}$  MC sample, vertex resolution and vertex finding efficiency in higher luminosity (e.g. higher beam background) were studied.

$B^0 \rightarrow K_S \pi^+ \pi^- \gamma$  analysis and exploiting  $B^+ \rightarrow J/\psi K^{*+}$ ,  $K^{*+} \rightarrow K_S \pi^+$  decay chain for calibration of  $K_S$ -based vertex were also discussed.

# Summary

- This project's first year activities were very successful.
  - Reem Rasheed stay at Nagoya to work together with Alessandro Gaz, B lifetime has been extracted from early data.
  - Kenkichi Miyabayashi, Miho Fujii and Yosuke Yusa visited Strasbourg, very detailed review discussion for transferring knowledge and analysis technique developed at Belle.
  - Further activity extensions were discussed:  $B^0 \rightarrow K_S \pi^+ \pi^- \gamma$  analysis, validation of B decay vertex with  $K_S$  by  $B^+ \rightarrow J/\psi K^{*+}$ ,  $K^{*+} \rightarrow K_S \pi^+$  decay chain, etc.
- Collaborating with other time-dep. CPV analysis working group members, we are making progress to get ready to analyze high statistics data to be accumulated at Belle II.