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Charmless B decay reconstruction in 5.15 fb^{-1} of early Phase III data

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Abstract

We report the material, approved for the Beauty 2019 conference, from studies of charmless $B^0 \to h^+h'^-$ ($h, h' = \pi$ or K) decays based on 5.15 fb^{-1} of early phase III data. Details in BELLE2-NOTE-PL-2019-025.

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1.1. MC, Fit and Pull

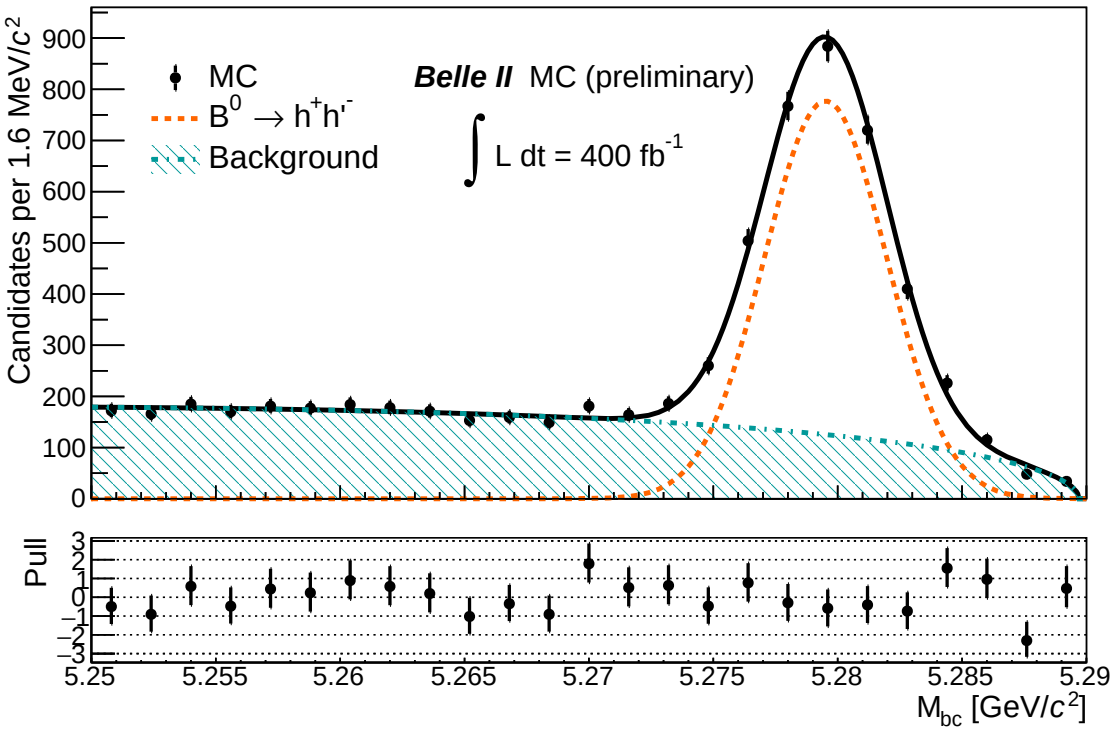

FIG. 1: Distribution of m_{bc} for $B^0 \to h^+h'^-$ ($h, h' = \pi$ or K) candidates reconstructed in 400 fb^{-1} of MC12b simulated data. Shown are data points, superimposed on the result of a 1D unbinned extended maximum likelihood fit, along with the pull distribution below.

All events are required to pass the hlt hadron skim selection criteria. Two or more charged tracks are required to accept an event. A first suppression of continuum events is achieved by restricting the ratio between the second and the zeroth Fox-Wolfram moments to $R2EventLevel < 0.5$. The charged-kaon and -pion candidate tracks are required to have transverse (longitudinal) displacement from the interaction point $dr < 0.5$ cm ($|dz| < 2.0$ cm). A requirement on the particle-identification likelihood ratio of > 0.1 is applied to both daughter candidates. A boosted decision tree (BDT) is trained using in total 30 variables, exploiting the different event shapes of $B\overline{B}$ and $q\overline{q}$ events. Contributions from continuum background are suppressed by requiring the BDT classifier to be larger than 0.5. The B^0 candidates are restricted to the signal region $|\Delta E| < 0.02$ GeV.

1.2. MC and Fit

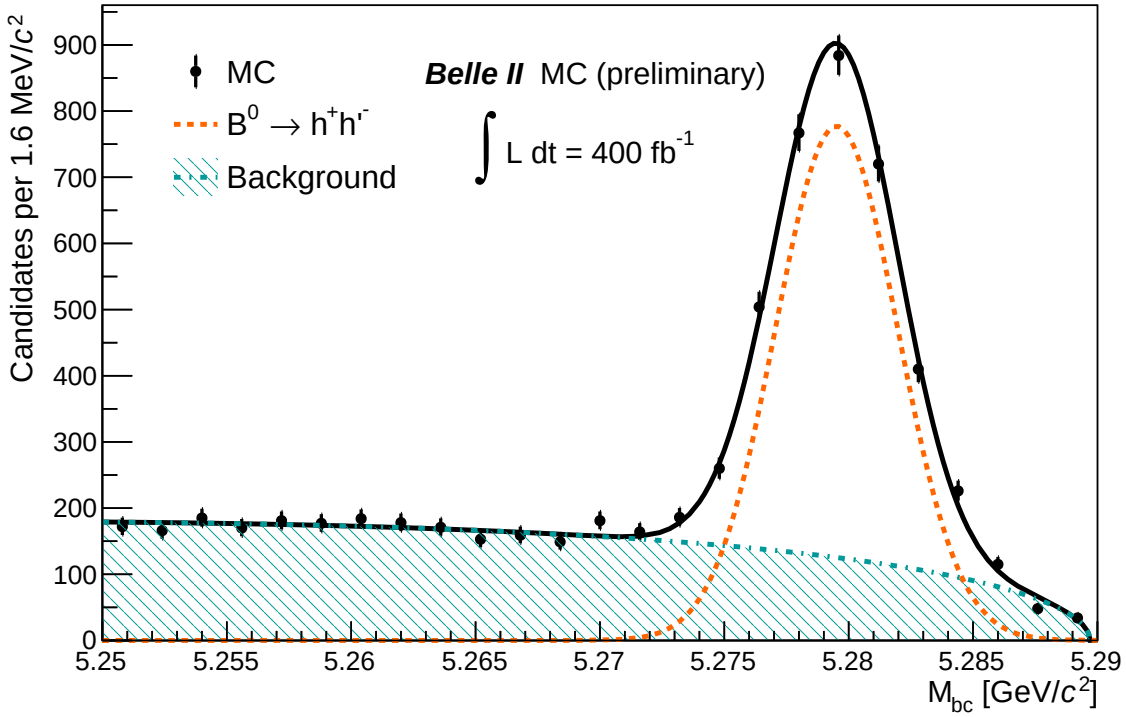

FIG. 2: Distribution of m_{bc} for $B^0 \to h^+h'^-$ ($h, h' = \pi$ or K) candidates reconstructed in 400 fb^{-1} of MC12b simulated data. Shown are data points, superimposed on the result of a 1D unbinned extended maximum likelihood fit.

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1.3. Data, Fit and Pull

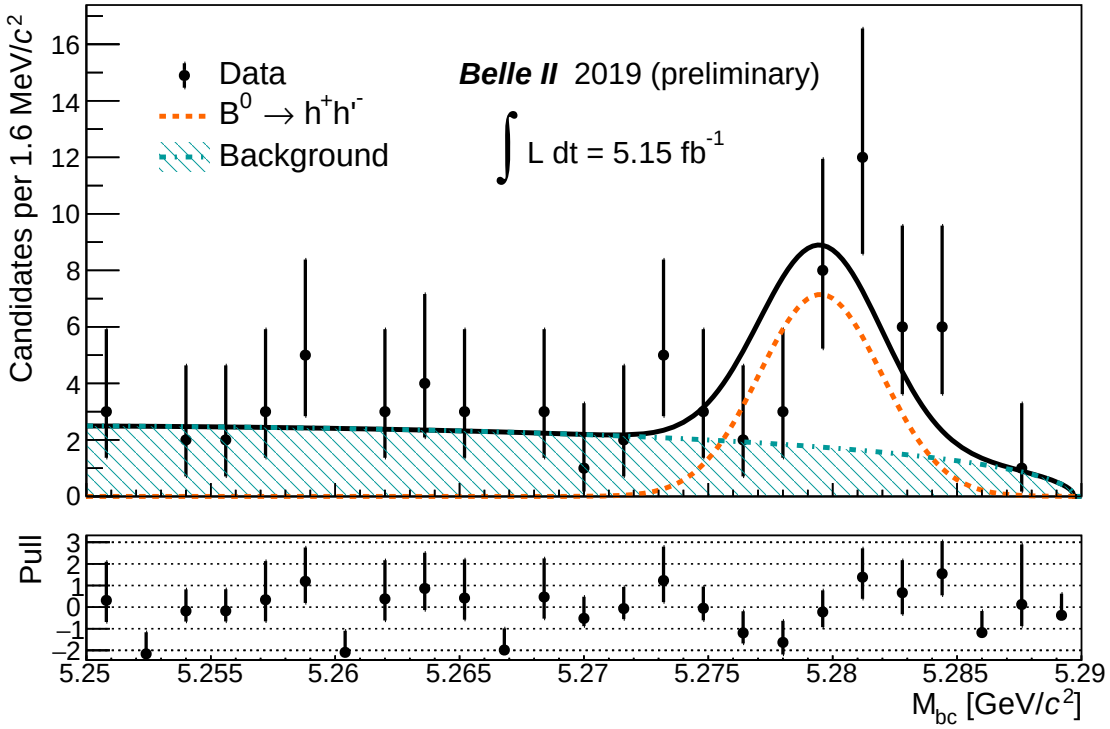

FIG. 3: Distribution of m_{bc} for $B^0 \to h^+h'^-$ ($h, h' = \pi$ or K) candidates reconstructed in 5.15 fb^{-1} of collision data. Shown are data points, superimposed on the result of a 1D unbinned extended maximum likelihood fit, along with the pull distribution below.

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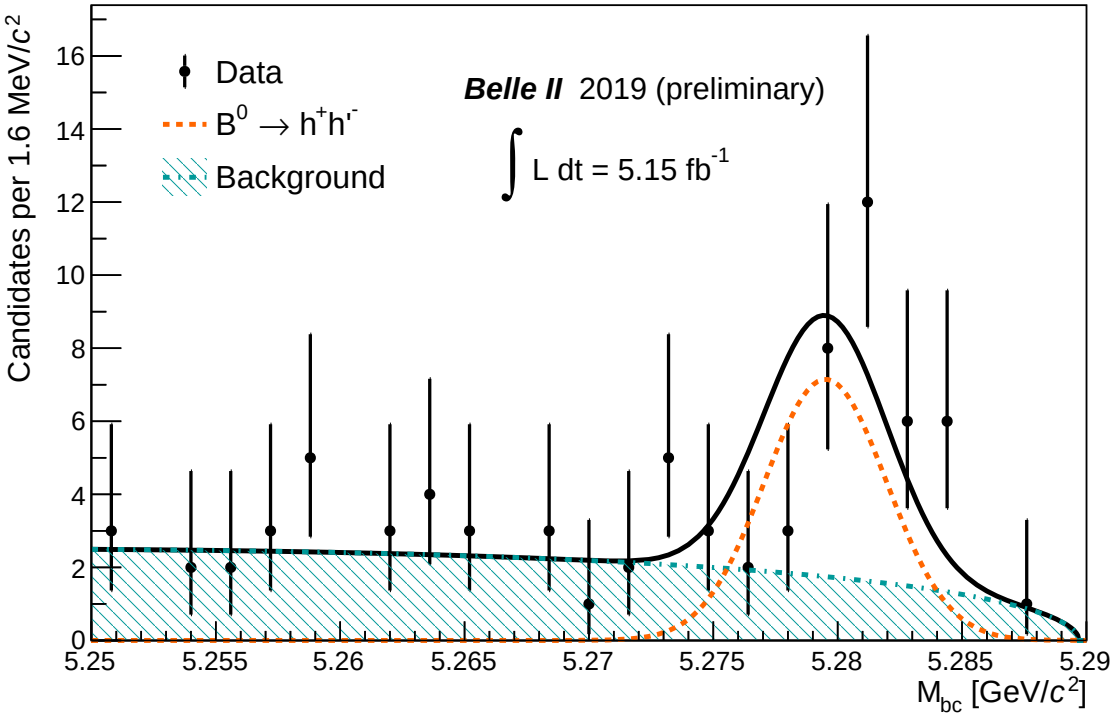

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2. FIT IN ΔE

2.1. MC, Fit and Pull

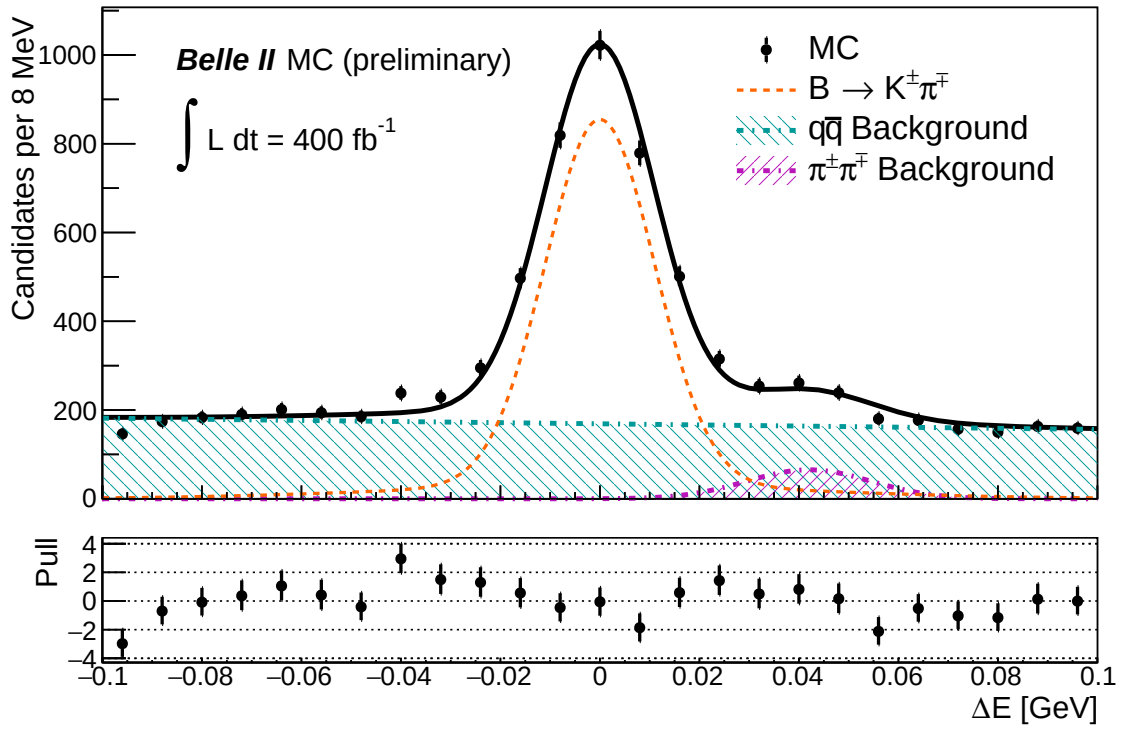

FIG. 5: Distribution of ΔE for $B^0 \to h^+h'^-$ ($h, h' = \pi$ or K) candidates reconstructed in 400 fb^{-1} of MC12b simulated data. Shown are data points, superimposed on the result of a 1D unbinned extended maximum likelihood fit, along with the pull distribution below.

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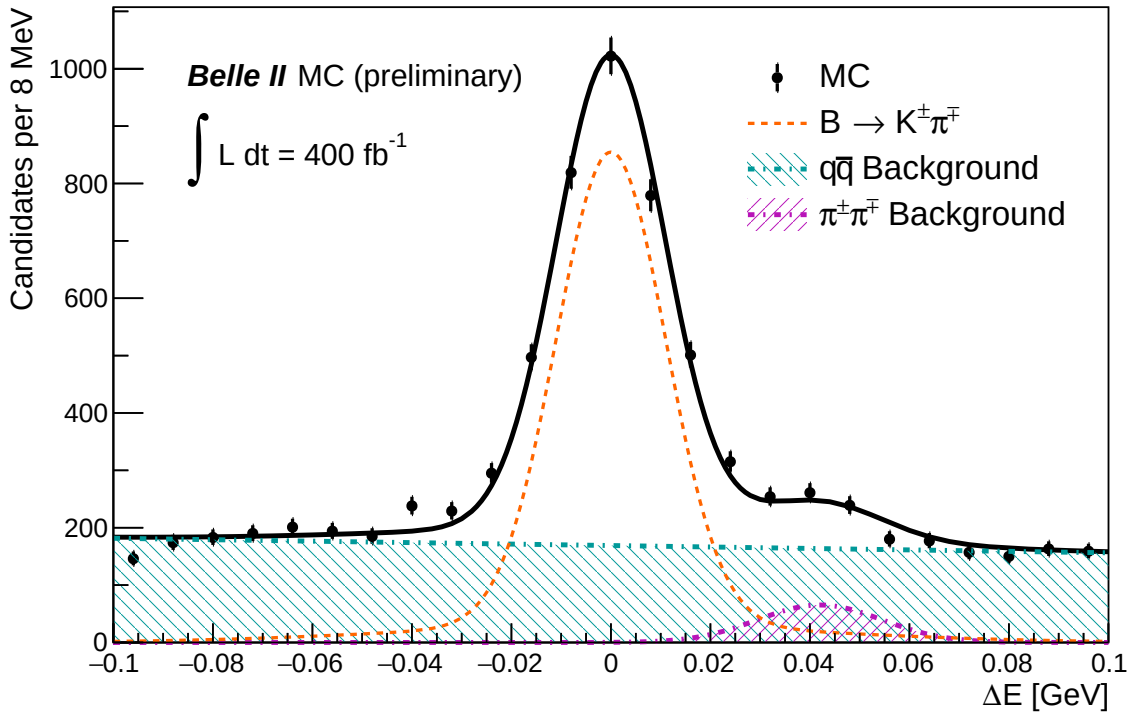
2.2. MC and Fit



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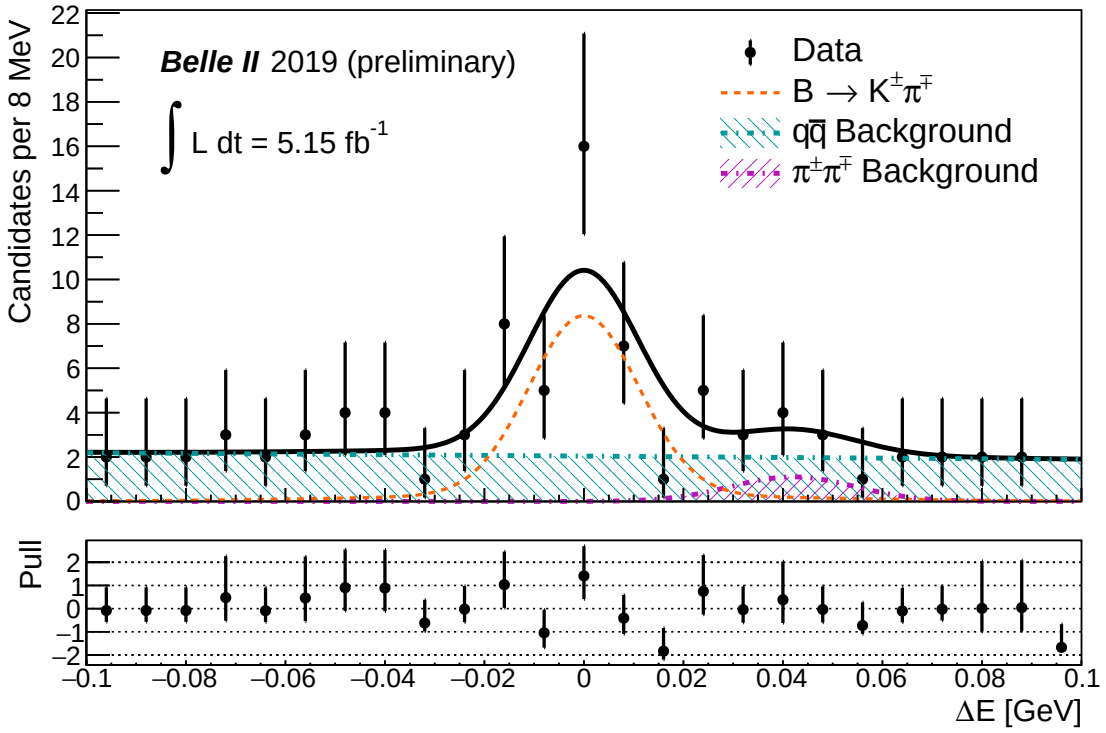

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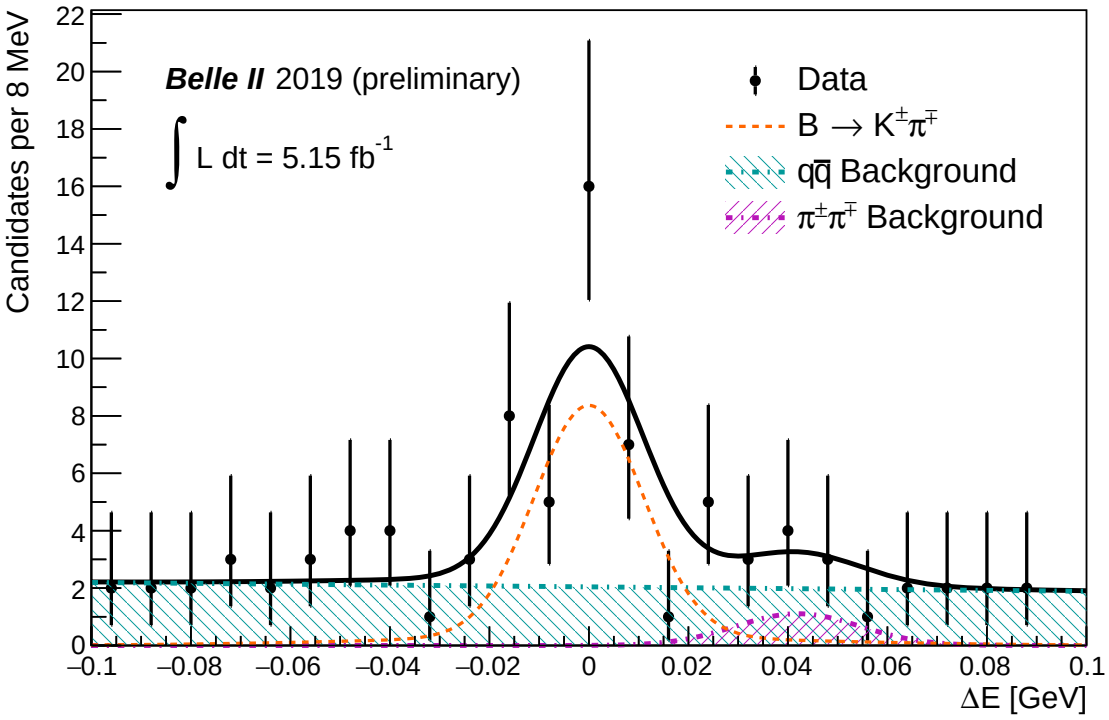

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