BELLE2-NOTE-XX-YYYY-ZZZ
DRAFT Version 1.0
August 14, 2019

D^0 reconstruction in proc9, Exp 3,7,8

K. Lautenbach* and J. S. Lange†

Justus Liebig Universitaet, Giessen, Germany

E. Prencipe‡

Forschungszentrum Juelich, Juelich, Germany

*Electronic address: klemens.lautenbach@belle2.kek.jp
†Electronic address: soeren.lange@belle2.kek.jp
‡Electronic address: e.prencipe@belle2.kek.jp

The following plots show D^0 reconstructed in 5 channels:

- $K^{\pm}\pi^{\mp}$,
- $K^{\pm}\pi^{\mp}\pi^0$,
- $K^{\pm}\pi^{\mp}\pi^{\pm}\pi^{\mp}$,
- $K_S^0\pi^{\pm}\pi^{\mp}$,
- $K^{\pm}K^{\mp}$.

For selection, we require the kaon and pion ID to be greater than 0.7 and the impact parameters of the tracks to match $|d0| < 0.5$ cm and $|dz| < 3$ cm. The π^0 is reconstrcuted in the mass range between $0.11 < M < 0.16$ GeV/c^2 and a decay angle, with respect to the π^0 momenta, of the first γ daughter in CMS frame of $|\psi_0| < 0.8$. In addition, we select photons with an energy greater than 0.12 GeV, more than 1.5 cluster hits in the ECL and a 9/21 cluster fraction of < 0.9. K_S^0 are selected with the $goodBelleKshort$ variable, featuring a displaced vertex, flight time and requirements on impact parameter.
So far, only on-resonant data of experiment 3, 7 and 8 was used.

The following figures show a fit to the data in the top plot and data only on the bottom plot. For most of the channels MC and data are in good agreement, with respect to the shape, as well as the comparison between signal yield determined by fitting (for data) and signal yield determined by MC truth information (for MC). The signal yield for data is calculated as the integral of the signal pdf (red curve).

To fit the $K^{\pm}\pi^{\mp}$, $K^{\pm}\pi^{\mp}\pi^0$ and $K^{\pm}\pi^{\mp}\pi^{\pm}\pi^{\mp}$ channel, two Gaussians plus a second order polynomial were used. For fitting the $K_S^0\pi^{\pm}\pi^{\mp}$ and the $K^{\pm}K^{\mp}$ channel, a single Gaussian plus a second order polynomial was used. The values for σ and μ, in case of the double Gaussian fit, are calculated as $\sigma = \sqrt{n_{g1} \cdot \sigma_{g1}^2 + (1 - n_{g1}) \cdot \sigma_{g2}^2}$ (or μ), where n_{g1} is the fraction of events under the first gaussian with the total function being normalized to one.

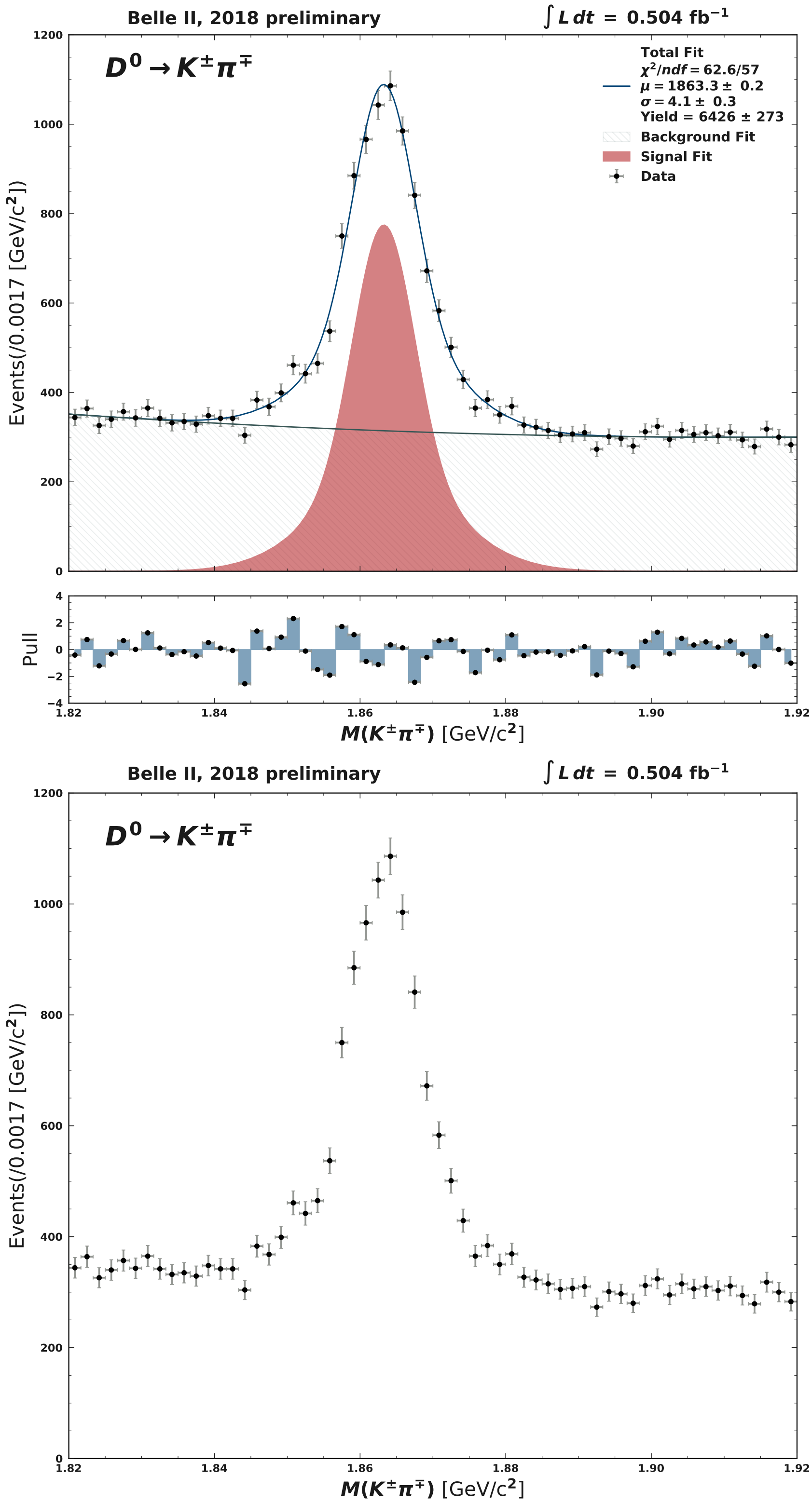


FIG. 1: D^0 reconstructed in $K^{\pm}\pi^{\mp}$.

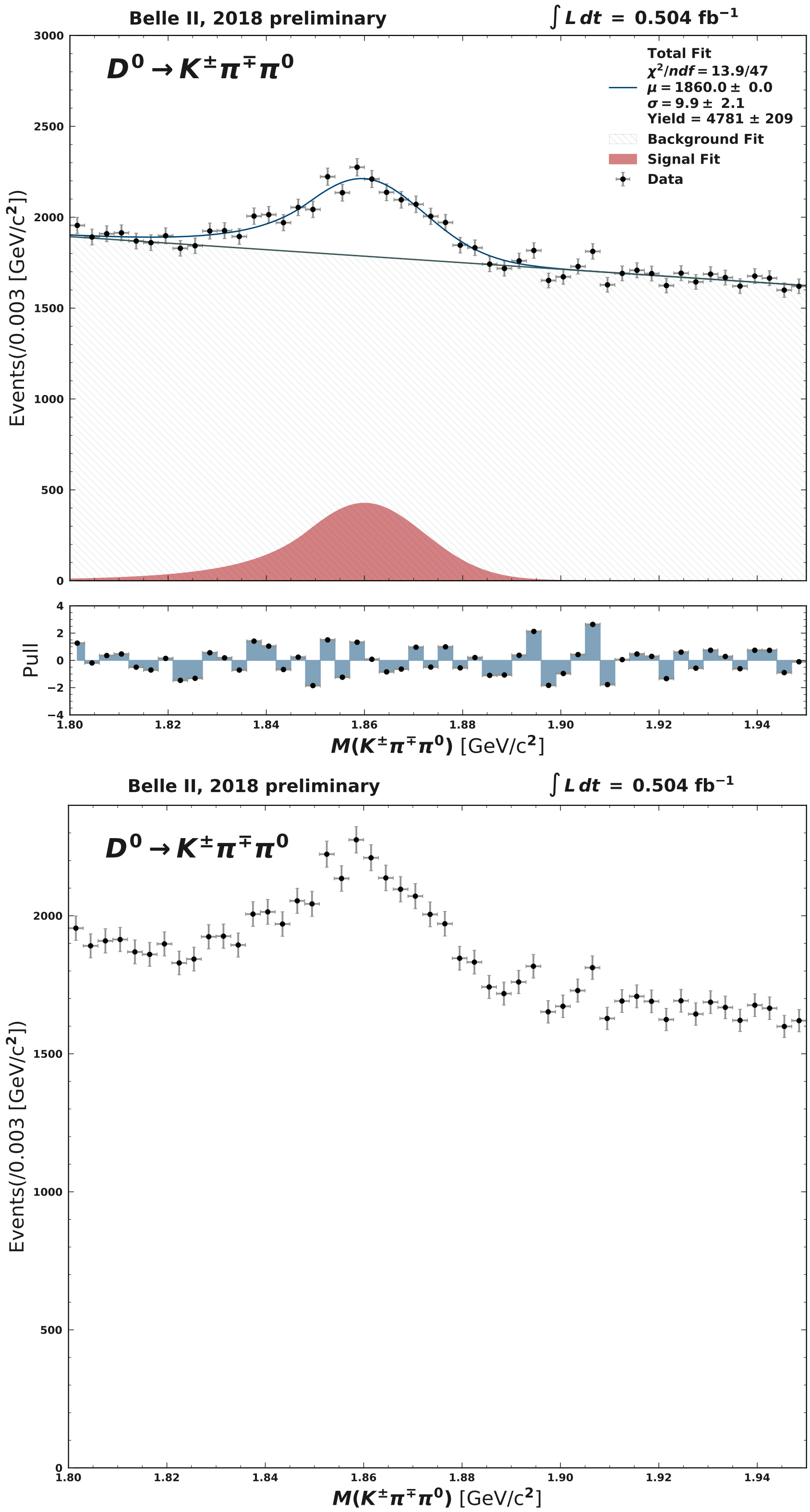


FIG. 2: D^0 reconstructed in $K^\pm \pi^\mp \pi^0$.

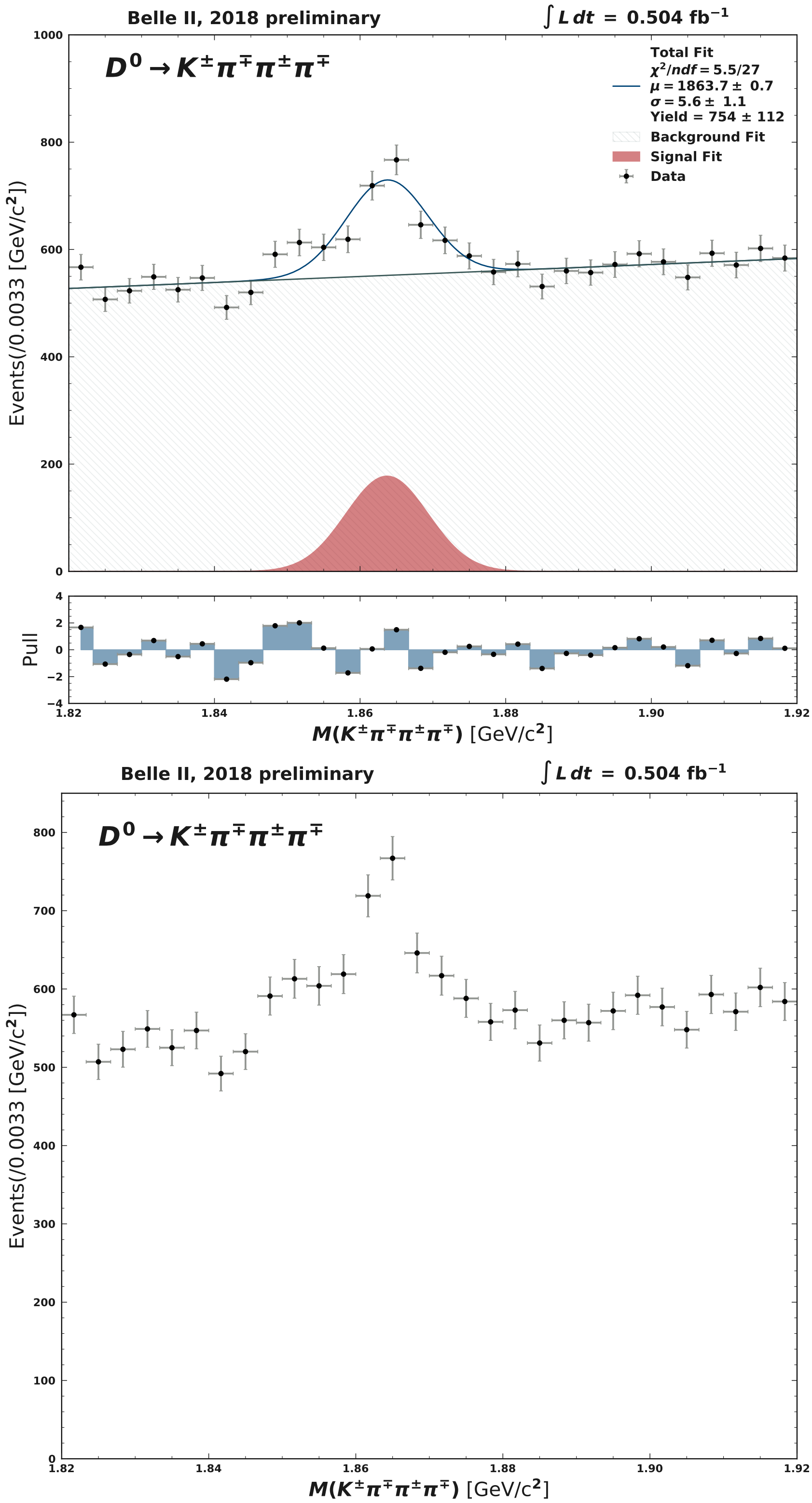


FIG. 3: D^0 reconstructed in $K^\pm\pi^\mp\pi^\pm\pi^\mp$.

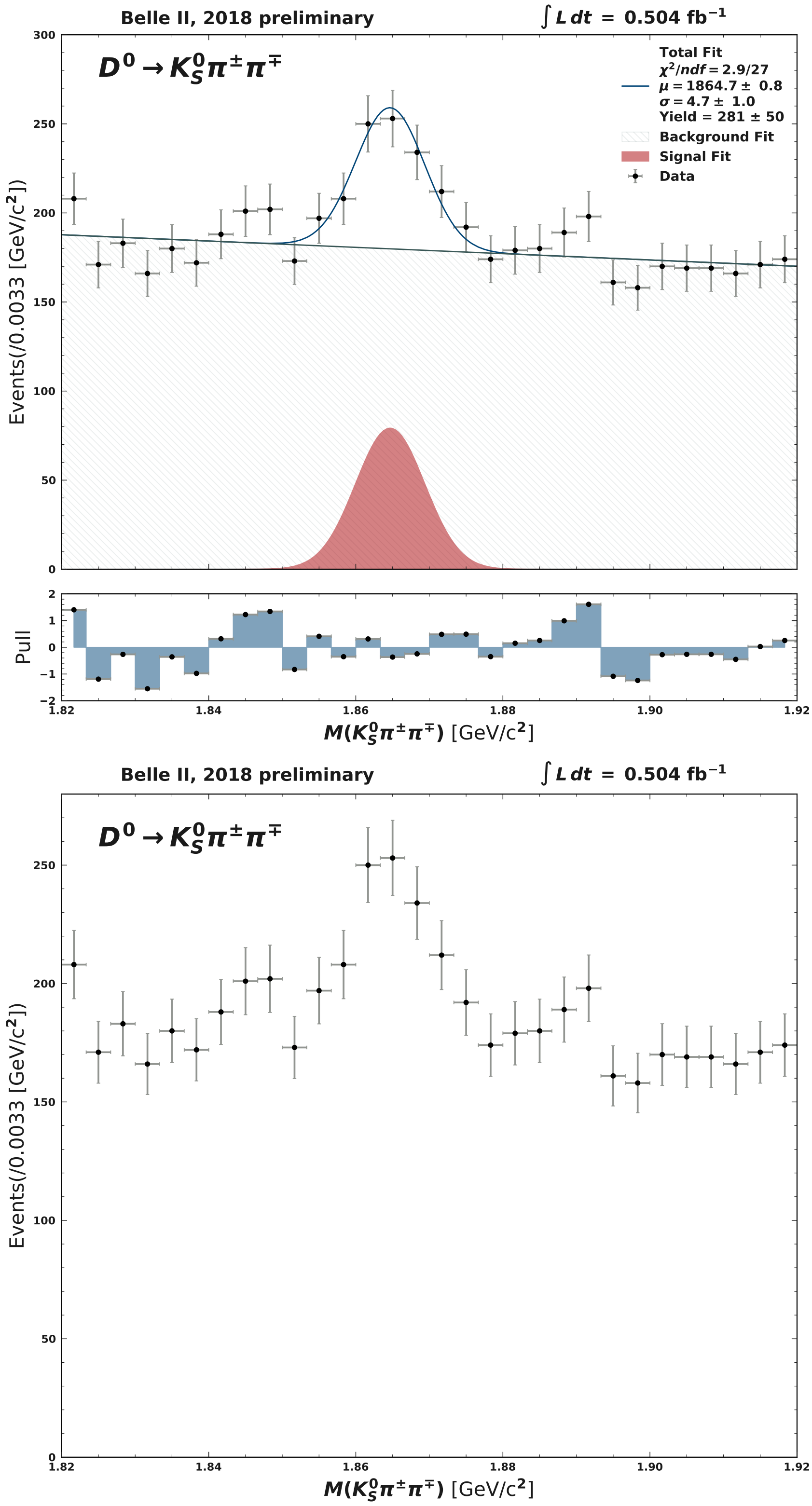


FIG. 4: D^0 reconstructed in $K_S^0\pi^\pm\pi^\mp$.

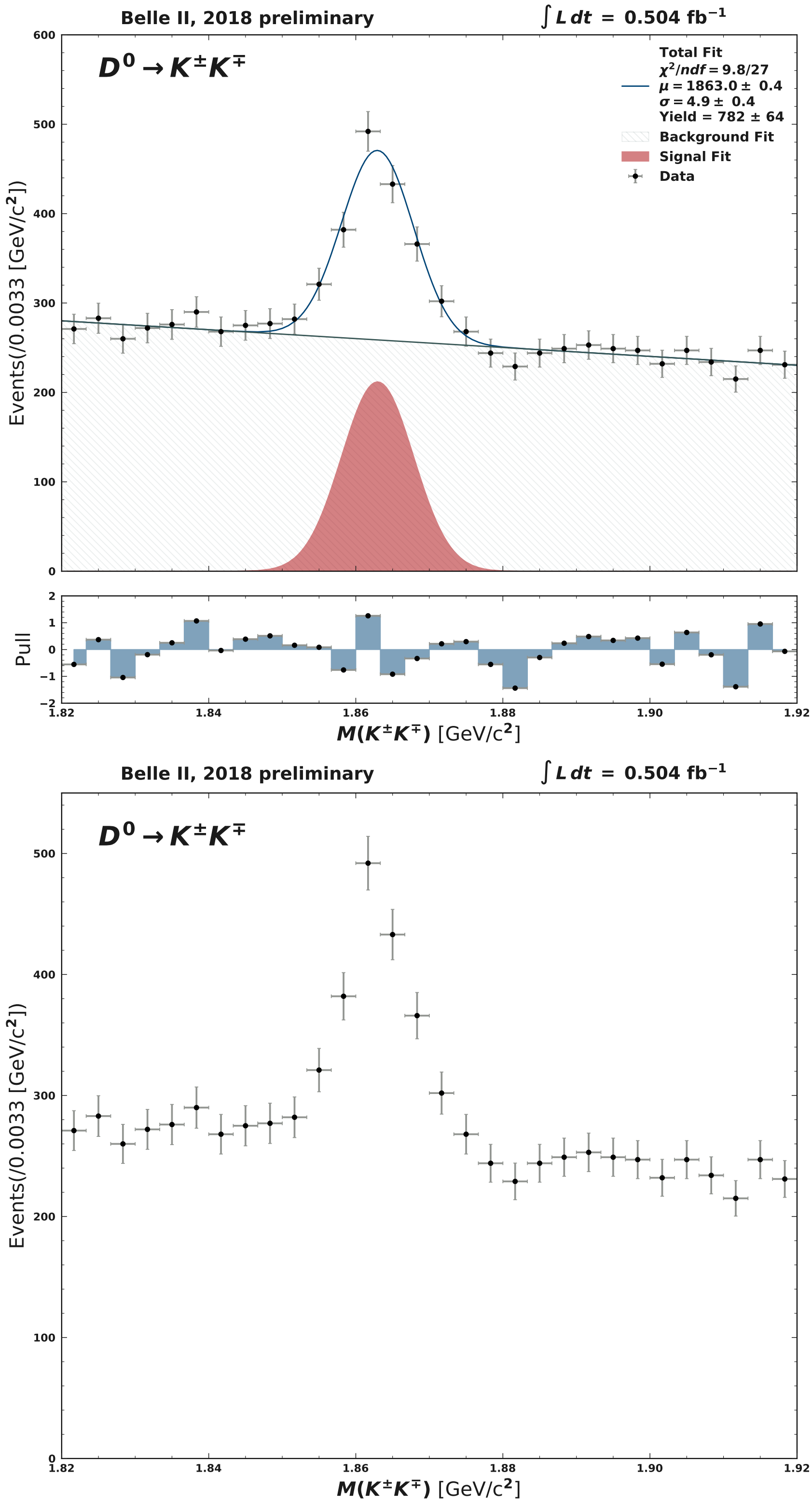
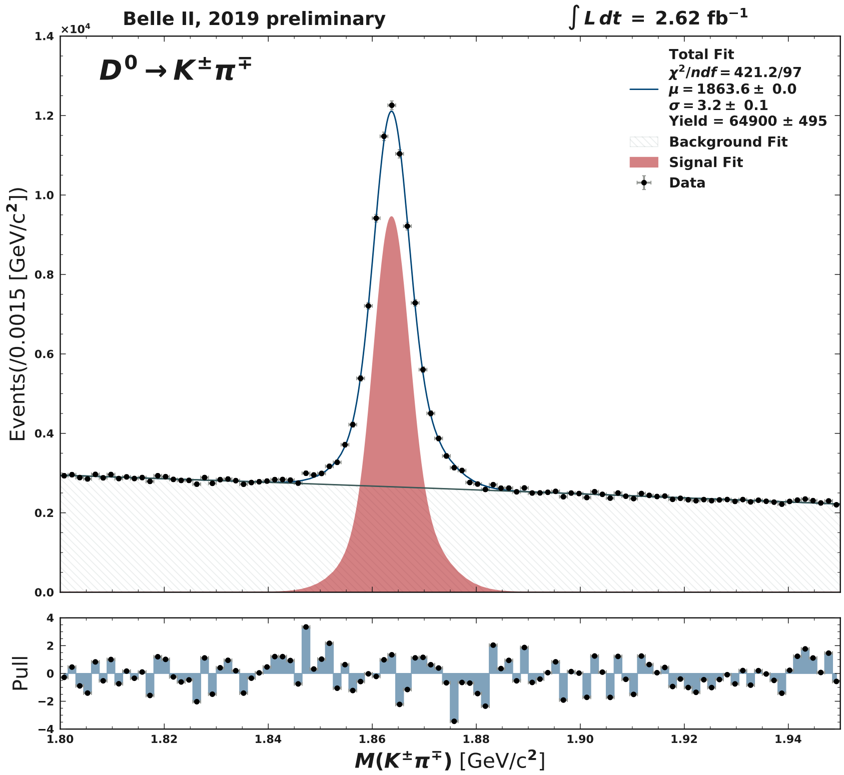


FIG. 5: D^0 reconstructed in $K^{\pm}K^{\mp}$.



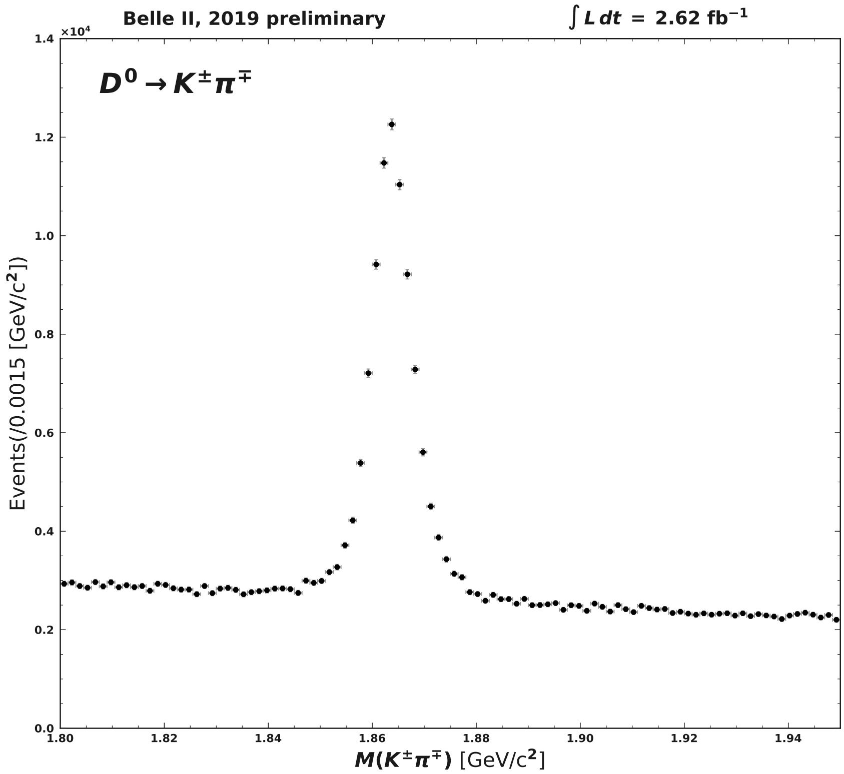


FIG. 6: D^0 reconstructed in $K^\pm\pi^\mp$.

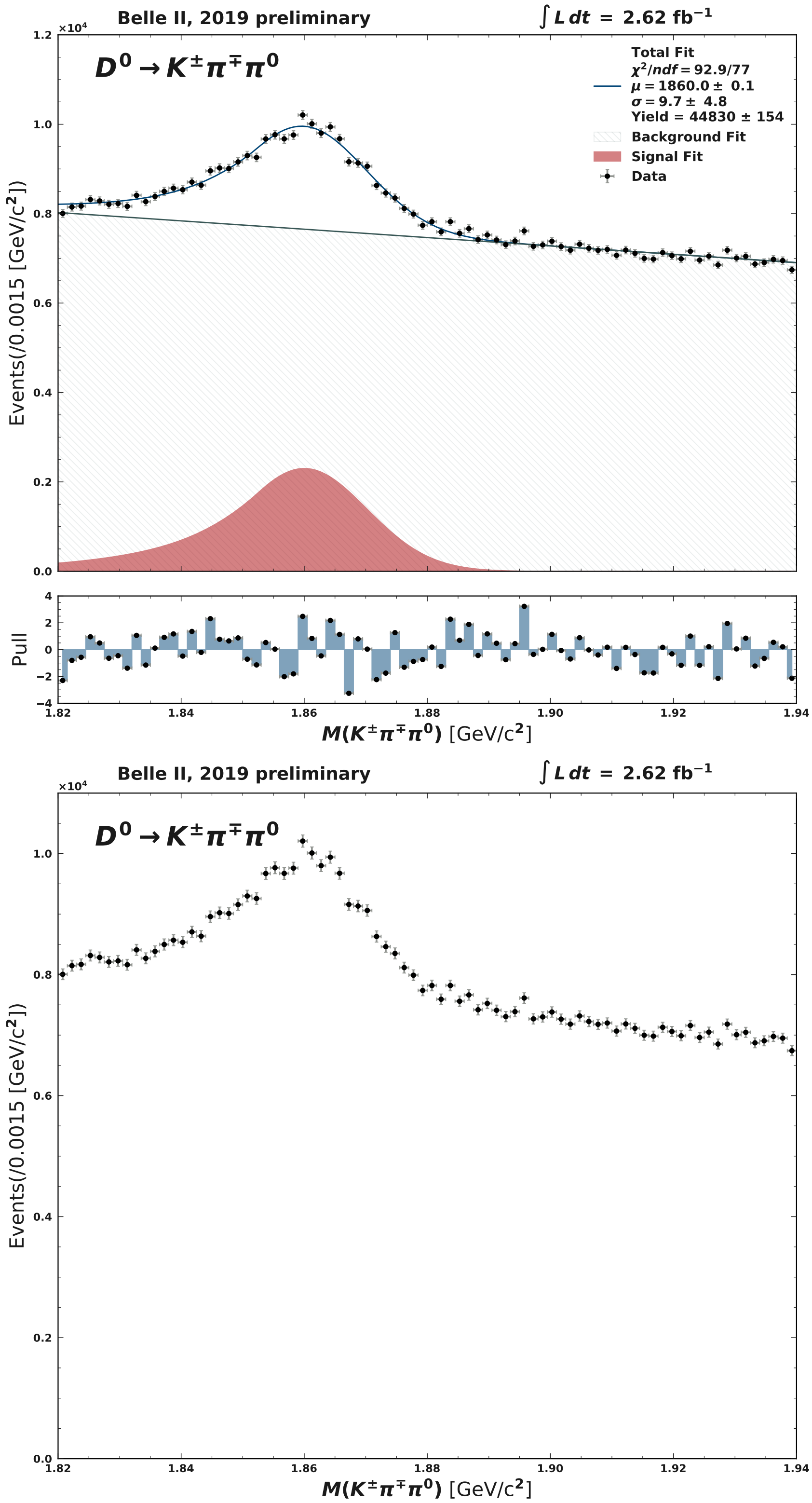


FIG. 7: D^0 reconstructed in $K^\pm\pi^\mp\pi^0$.

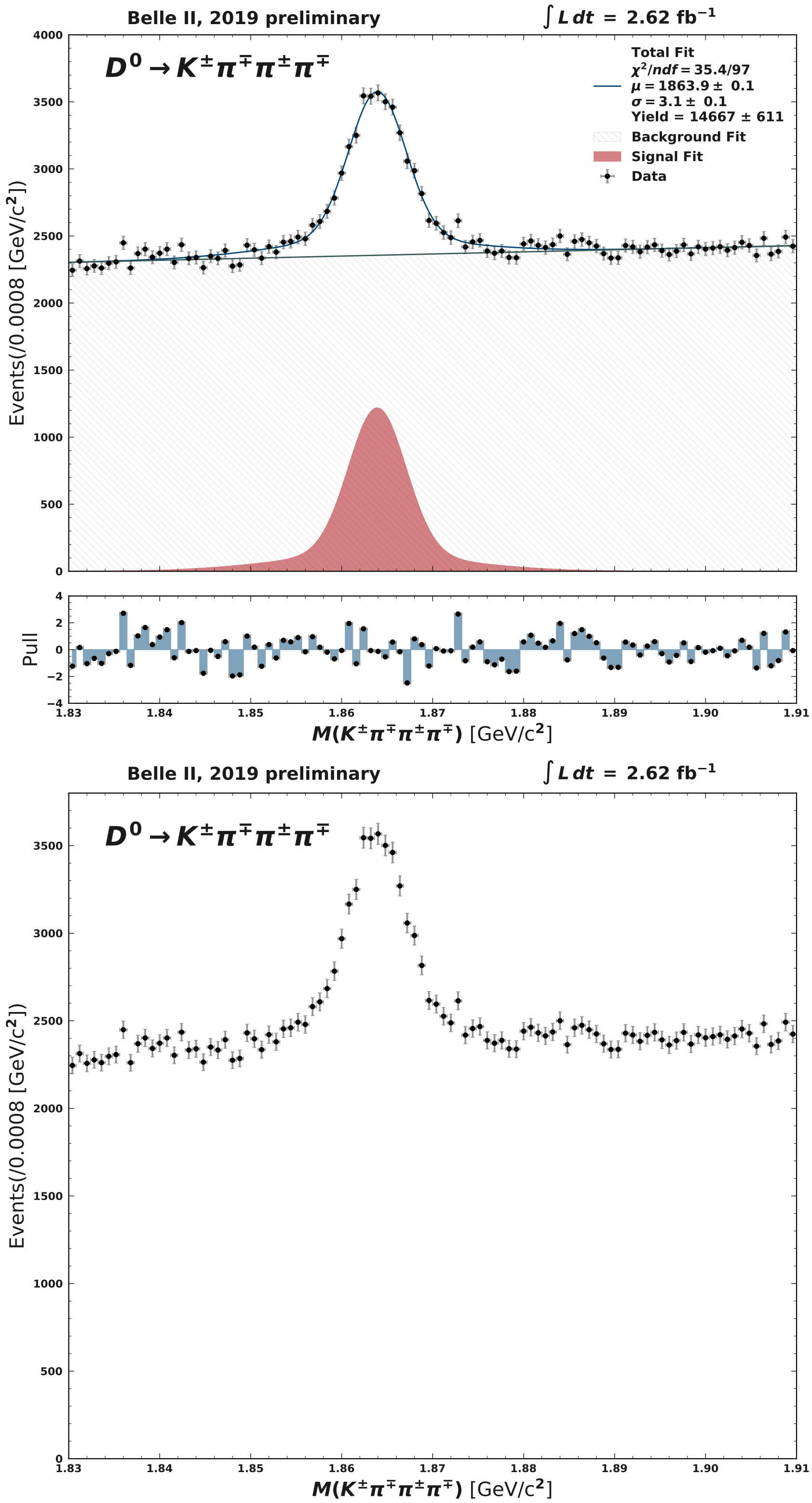


FIG. 8: D^0 reconstructed in $K^\pm\pi^\mp\pi^\pm\pi^\mp$ channel.

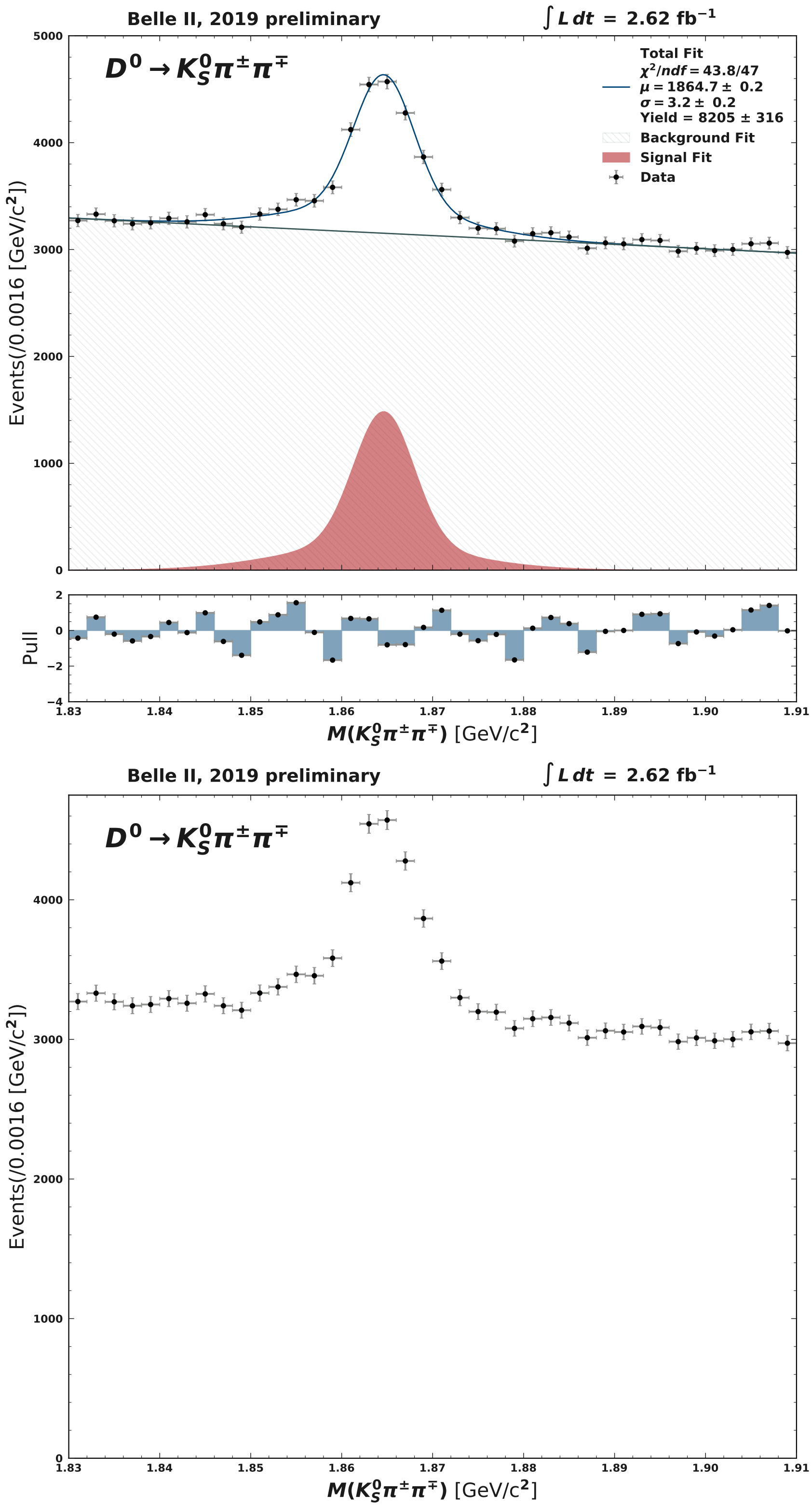


FIG. 9: D^0 reconstructed in $K_S^0\pi^\pm\pi^\mp$.

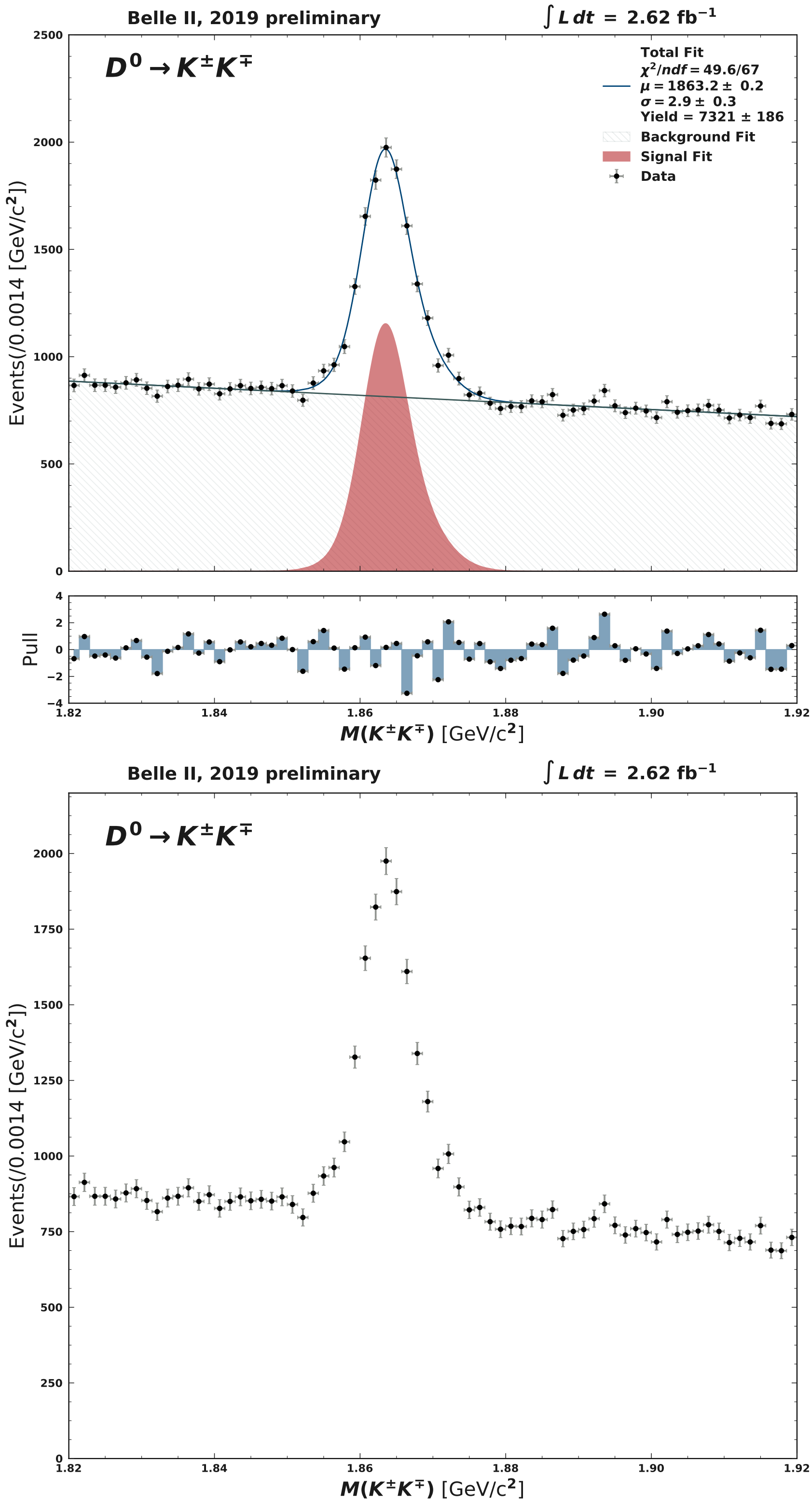


FIG. 10: D^0 reconstructed in $K^{\pm}K^{\mp}$.