Rediscovery of $D^0 \to K_S\pi^0$ with Belle II Detector

The Belle II collaboration

Abstract

This note reports the plots for the rediscovery of decay mode $D^{*+} \to D^0\pi_s^+$, $D^0 \to K_S\pi^0$ with Belle II data corresponding to an integrated luminosity of 34.6 fb^{-1}. Details of this study are reported in the internal document BELLE2-NOTE-PH-2020-037.

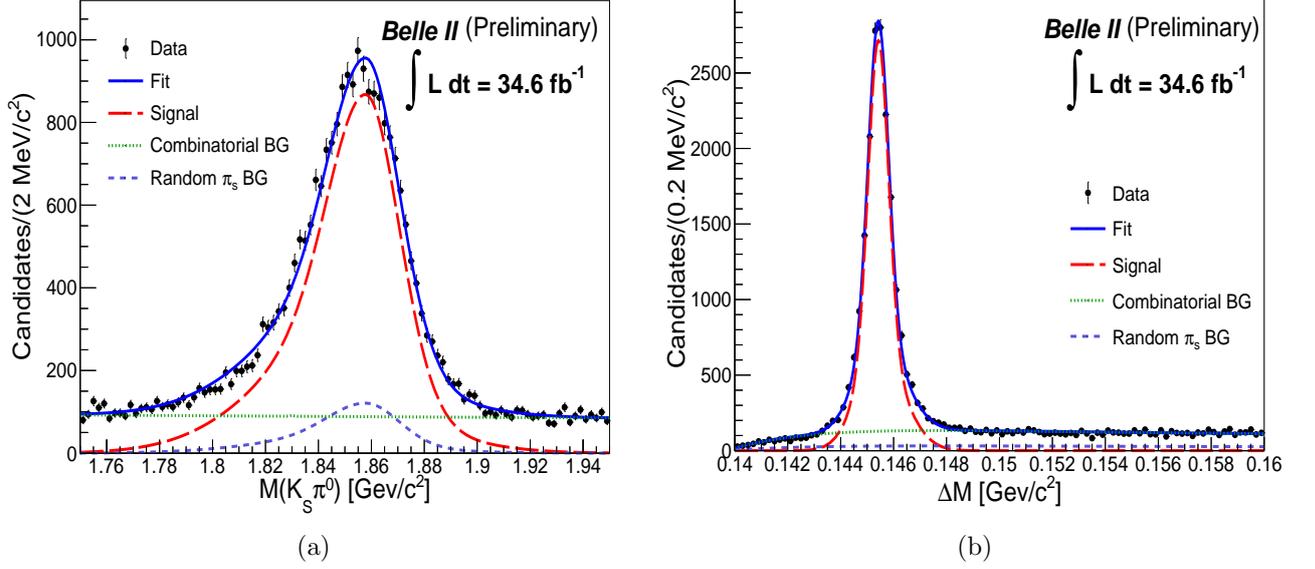Fig. 1: Unbinned maximum likelihood 2D fit which is performed with (a)M($K_S\pi^0$) and (b)ΔM(M($K_S\pi^0\pi^+$) - M($K_S\pi^0$)). To fit the signal component, sum of two gaussian and bifurcated gaussian functions is used for M($K_S\pi^0$), whereas sum of gaussian and bifurcated gaussian functions is used for ΔM distribution.

Exponential and threshold functions are used to fit a combinatorial background component in M($K_S\pi^0$) and ΔM, respectively.

Peaking(in M($K_S\pi^0$)) background which is due to the combination of real D^0 candidates and fake soft pion(π_s) candidates is fitted by using sum of two gaussian and bifurcated gaussian functions in M($K_S\pi^0$) whereas this background contribution is fitted with threshold function in ΔM.

The signal, combinatorial background and random π_s background are shown with red dashed, green dotted and purple dashed lines, respectively.

Observed yield for $D^{*+} \to D^0\pi_s^+$, $D^0 \to K_S\pi^0$ with Belle II data corresponding to an integrated luminosity 34.6 fb^{-1} is 16800 $\pm$ 150, where uncertainty is only statistical. Details about this study are reported in the internal document BELLE2-NOTE-PH-2020-037.