BELLE2-NOTE-PL-YYYY-ZZZ
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Λ_c rediscovery in early Phase 3 Belle II data

Abstract

This note describes $\Lambda_c^+ \to pK^-\pi^+$ reconstruction in the data sample collected by Belle II during 2019 corresponding to 8.8 fb $^{-1}$ of integrated luminosity.

Contents

1. PLOT FOR APPROVAL

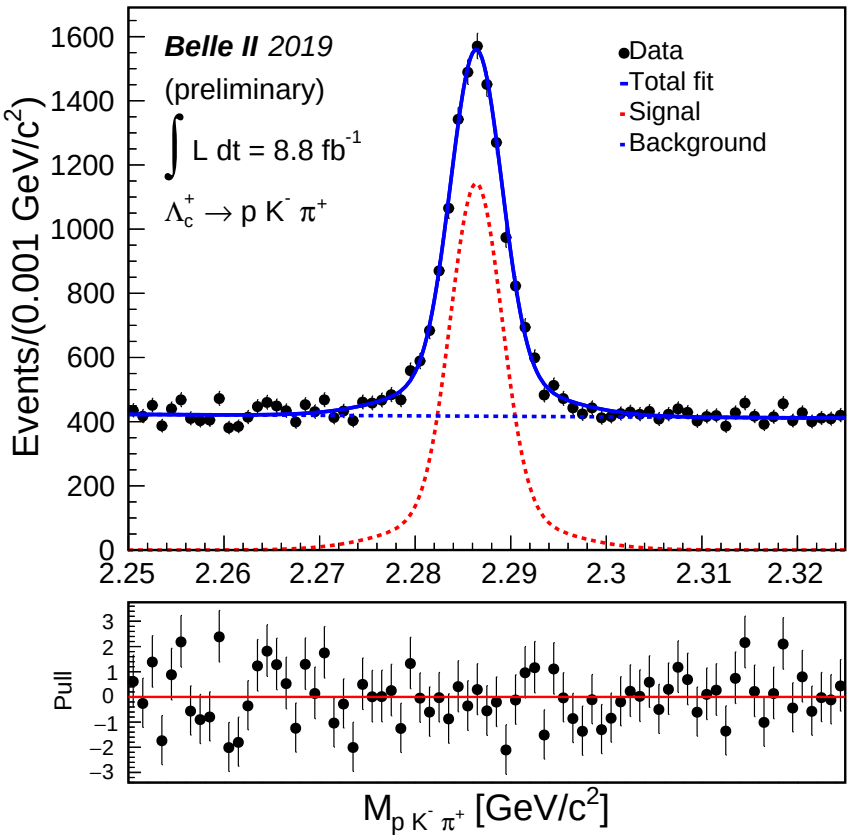

FIG. 1: This figure shows the unbinned maximum likelihood fit performed on the invariant mass distribution of $\Lambda_c^+ \to pK^-\pi^+$ in 8.8 fb^{-1} of phase3 data.

The fitting function used to describe the signal consists of the sum of two Gaussians, whereas for the background the function chosen is a first order Chebyshev polynomial. Fig. 1 shows the fit of the invariant mass performed on the data sample collected during 2019. Several quantities of interest are listed in Table I.Reported yields and purity are calculated in a signal region of ± 10 MeV ($\sim 3\sigma$) around the mean value. Mass peak value is in perfect agreement with the PDG [1] current reported value. The average resolution (denoted as $< \sigma >$) is calculated as:

$$< \sigma > = \sqrt{n_{g1} \cdot \sigma_{g1}^2 + (1 - n_{g1}) \cdot \sigma_{g2}^2} \tag{1}$$

where σ_{g1} and σ_{g2} are the the widths of the two gaussians evaluated in the fit and n_{g1} is the fraction of events under the first gaussian with the total function being normalized to one. Details about this study is reported in internal document BELLE2-NOTE-PH-2020-020.

	data (Proc11)
Peak position [MeV/c^2]	2286.4 ± 0.1
$< \sigma >$ [MeV/c^2]	4.287 ± 0.759
χ^2/ndf	1.09
Signal yields per 1/fb	984 ± 6
Purity	0.508 ± 0.002

TABLE I: Comparison of signal-peak parameters, goodness of fit, signal yields / fb $^{-1}$ and purity (quoted uncertainities are statistical only).

[1] M. Tanabashi et al., Particle Data Group, *Review of Particle Physics*, Phys. Rev. D **98** (2018) no. 3, 030001.