First ${}^{12}_{\Lambda}C$ candidate in FINUDA. Very preliminary results

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Results reported in this memo have been obtained by using the FIDARC program version 506. The data sample corresponds to 20 days of data taking (3 December - 23 December 2003), from run 535 to run 1053. The total number of K^+K^- is about 2.8 Millions. Data are analyzed by using a CWN (Column Wise Ntupla) ID=500 booked by the Finuda Frascati group.

The cuts applied to the data sample to get the spectrum of fig.1 are:

- negative track from a K^- (pion candidate)
- a fitted track with 4 points in the spectrometer
- a forward track
- $-7.5^0 <$ Angle between the negative track and the z-axis $< 7.5^0$
- the particle momentum reconstructed corrected for the energy loss in the crossed materials

All the tracks coming from the 3 carbon targets are added. The total number of events in the distribution is about 7000

The plot in fig.2 is obtained by applying the following cuts to the whole data sample:

- a positive track from a K^-
- a fitted track (4 hits in the spectrometer)
- $-15^0 <$ Angle between the negative track and the z-axis $< 15^0$
- the particle momentum reconstructed corrected for the energy loss in the crossed materials

Track from all targets are added.

All the cut mentioned above have been chosen by varying them in order to obtain the best signal-to-noise ratio, with no detailed optimization studies being done.

The consistency of adding all the three carbon targets has been checked by looking at the μ^+ momentum coming from the K^+ decays in the three

Units are GeV/c	Value
Exp1	20.8 ± 0.4
Exp2	-67.3 ± 1.7
Ampl G1	23.7 ± 7.7
Peak G1	0.2612 ± 0.0003
Width G1	$0.8 \pm 0.2 \times 10^{-}3$
Ampl G2	18.5 ± 5.3
Peak G2	0.2746 ± 0.0002
Width G2	$0.8 \pm 0.2 \times 10^{-}3$

Table 1
Output of the fit in fig.1

carbon targets separately (fig.3). The three peaks obtained presents a maximum variation of about 400 keV/c between them. This momentum shift, which has to be taken into control in future studies, has been considered negligible at this level of analysis.

Another simple check done is the time stability of the data. Fig.4 shows the mean value (not the peak position as it would be more correctly done) of the μ^+ momentum as a function of run number. Even if the band is rather flat, it has a width of about 500 KeV/c, which however has been considered negligible at the present level of analysis. Data from run 853 to 863 (the point out from the band in the picture) are removed from the data sample of figure 1.

The fit in fig.1 is done by using an exponential curve for the background and two Gaussian curves for the peaks at 260 and 275 MeV/c respectively. Table 1 summarize the main results of the fit which returns a χ^2/ndf of 1.04

The yields of the peaks in fig.1 are 117±50 (260 MeV/c) and 94±37 (260 MeV/c) where errors are evaluated by means of the formula:

$$\sigma_Y = \sqrt{(2 \times \pi \times Ampl_g \times Width_g)}/(binwidth)$$

Many further improvements can be, and have to be done in next future, but the first results are encouraging. Detailed studies on the background parametrization have to be done as well as studies on the improvement of the signal to noise ratio.

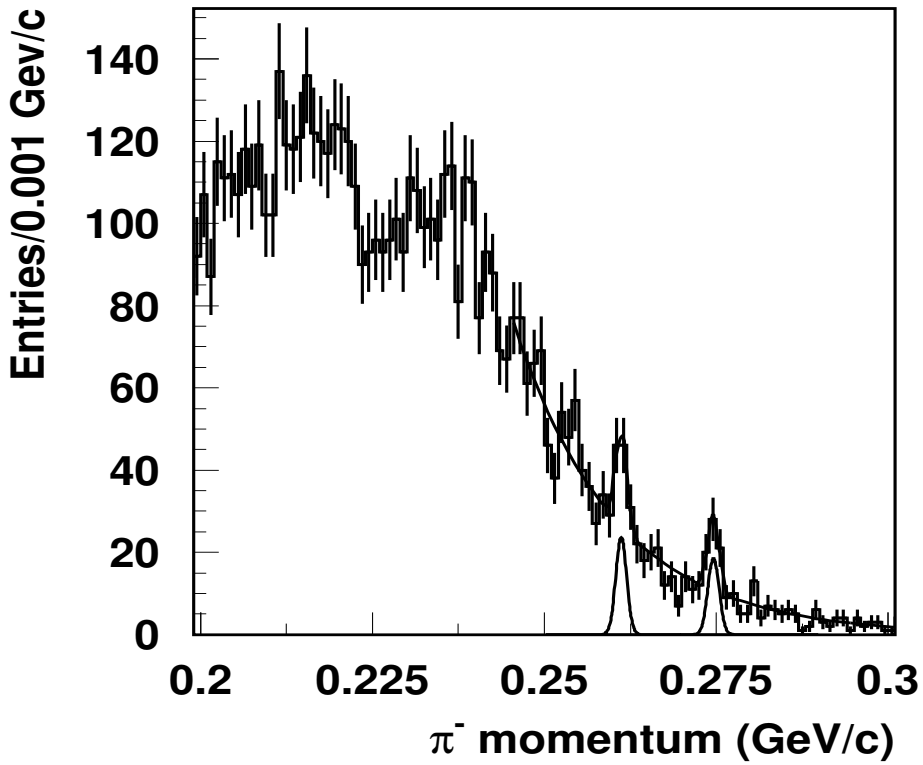

Fig. 1. Negative tracks momentum coming from K^-

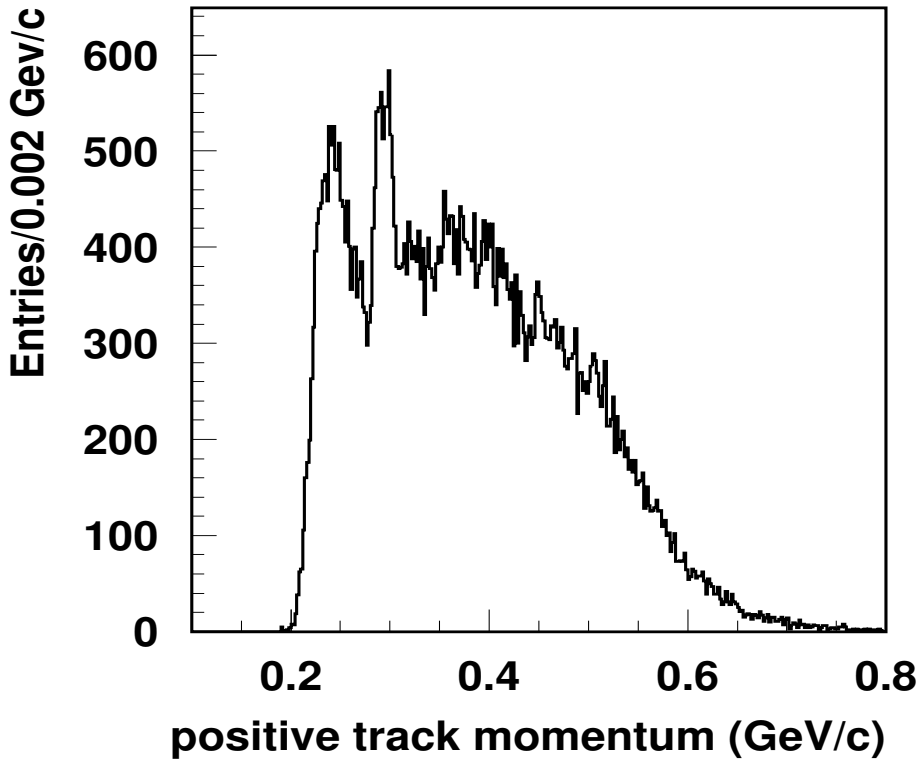

Fig. 2. Positive particle momentum associated to K^- stopping inside the targets

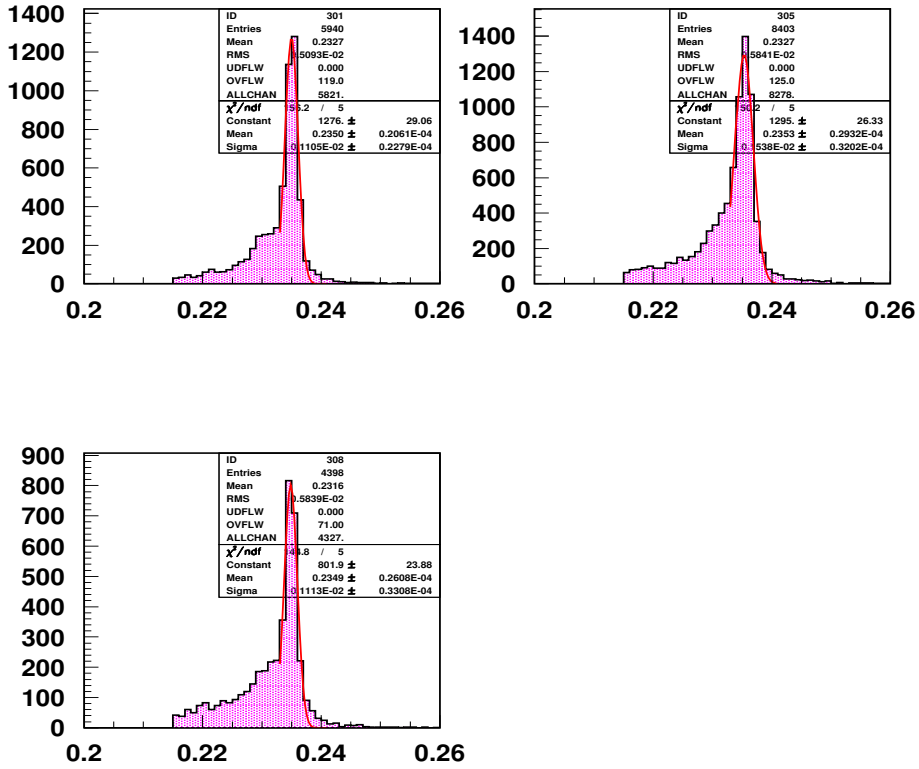

Fig. 3. μ^+ momentum from K^+ decay inside the three carbon targets.

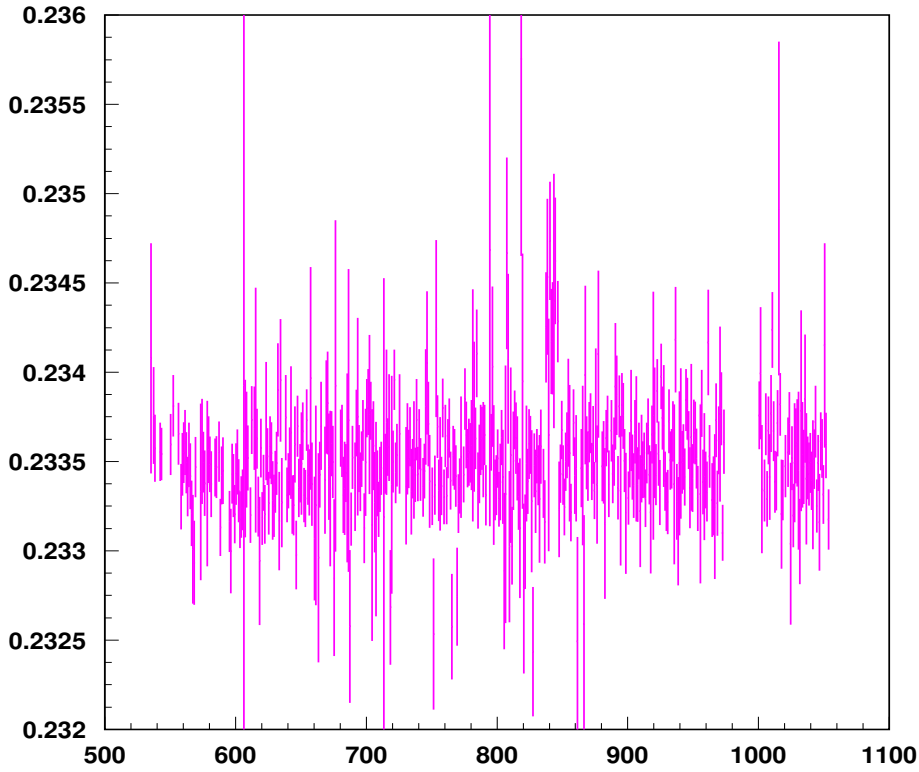

Fig. 4. mean value of μ^+ distribution as a function of the run number.