

Study of neutron-rich Λ hypernuclei would give information concerning the Λ - Σ coupling as well as baryon interaction in high density nuclear matter such as neutron star.

The present experiment was carried out at the K6 beam line of KEK 12-GeV proton synchrotron (PS) together with the superconducting kaon spectrometer (SKS) system. The total beam time was 30 days in two cycles of the year 2002 and 2003. We used a ^{10}B target of 3.5 g/cm^2 thickness. We started with a beam momentum of $1.05\text{ GeV}/c$, but the yield in the bound region was about one order magnitude lower than expected from the theoretical calculation.

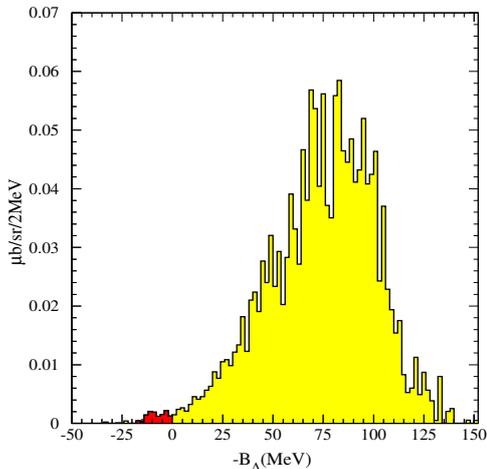


Figure 1: Missing mass spectrum

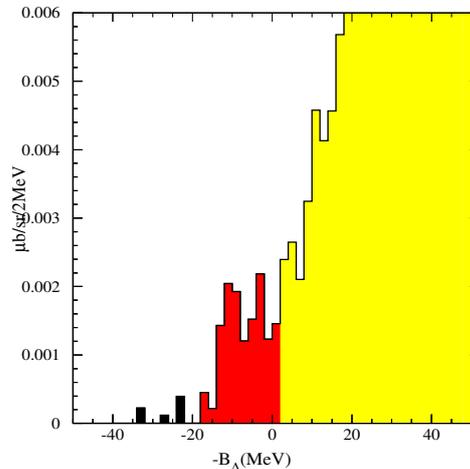


Figure 2: An expanded view

We then changed the beam momentum to $1.2\text{ GeV}/c$, where the Σ^- production channel is open and took data for about 450×10^9 π^- injection in 2002. We found that the yield in the bound region was increased about twice, whereas the QF yield was about one order of magnitude higher as compared to the $1.05\text{ GeV}/c$ data. In year 2003 run, we continued with the beam momentum at $1.2\text{ GeV}/c$ and accumulated data for another 700×10^9 π^- injection. The spectrum in year 2003 was found to be very identical with that in year 2002 and we simply added two spectra together. Figure 1 shows the missing mass spectrum on ^{10}B at $1.2\text{ GeV}/c$ for all data we took in E521, whereas figure 2 is an expanded view for the bound region. In total, we got about 40 counts in the bound region, although no significant discrete peaks were observed, which may be due to the limited statistics, the experimental resolution and possible complicated nuclear structure. In the off-line analysis backgrounds were reduced as much as possible and almost all events in the bound region are expected to come from the signal of the produced hypernucleus, $^{10}_{\Lambda}\text{Li}$. From the present experimental result, we found that the Λ production rate in the (π^-, K^+) reaction is roughly 3 order of magnitude smaller (10^{-3}) as compared to that in the (π^+, K^+) reaction.