Hypernuclear Spectroscopy with FINUDA

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ABSTRACT

The FINUDA experiment[1] running at the DAΦNE ϕ-factory in Frascati studies hypernuclear physics using the low energy (16 MeV) K^-, coming from the ϕ decay, to produce Λ-hypernuclei through the $K^-_{stop} +^A Z \rightarrow^A_\Lambda Z + \pi^-$ reaction.

The apparatus has shown to reach a high energy resolution (1.1 MeV) and large acceptance for the π^- coming from hypernucleus formation, moreover it has excellent detection capabilty for the products coming from hypernucleus decay. Such characteristics besides the luminosity of the machine allow to detect and fully reconstruct the products from weak decays of hypernuclei. Actually FINUDA can study simultaneously high resolution spectroscopy, weak decay modes of hypernuclei and search of neutron-rich hypernuclei.

During the first round of data taking, from October 2003 up to March 2004, FINUDA has collected an integrated luminosity of $\sim 200 pb^{-1}$, corresponding to about one million of hypernuclear events on the following targets: $2 \times^6 Li$, ^7Li, $3 \times^{12} C$, ^{27}Al and ^{51}V.

Data analysis is still in progress, however some results have been already published and they will be shown in the talk. In particular good results have been obtained for the $^{12}_\Lambda C$[2, 3] and $^7_\Lambda Li$[4] hypernuclear systems.

Furthermore production of neutron rich Λ-hypernuclei via (K^-_{stop}, π^+) reaction has been studied and upper limits for $^6_\Lambda H$ and $^7_\Lambda H$ hypernuclei[5] have been determined.

A second round of data taking has been started on October 2006 and it will end on May 2007, when a statistics corresponding to an integreted luminosity of $\sim 1 fb^{-1}$ (5 times more than the previous one) will be collected. Here a set of different targets is used: $2 \times^6 Li$, $2 \times^7 Li$, $2 \times^9 Be$, ^{13}C and D_2O. Some preliminary results on the current data taking will be presented as well.

References

[1] P. Gianotti et al., *Nucl. Phys.* **A691** (2001) 483c and references therein.

[2] M. Agnello et al., *Phys. Lett.* **B622** (2005) 35.

[3] M. Agnello et al., Proc. of HYP2006 to be published on *Eur. Phys. J.*

[4] M. Agnello et al., Proc. of HYP2006 to be published on *Eur. Phys. J.*

[5] M. Agnello et al., *Phys. Lett.* **B640** (2006) 145.