Spin, Parity & Width

Spin is currently unknown
- the theoretical prejudice is _.

Parity is currently unknown
- the theoretical prejudice is +

Width is not known. We have seen numbers ranging from upper limits of 9-20 MeV from observation experiments, down to under 1MeV from a reanalysis of old K^+d scattering data.

Isospin is not currently known, but the evidence is Pointing toward zero.

JLab Hall A

Bogdan Wojtsekhowski:

Using different combinations of detectors in Hall A, including a new "low resolution device, one can produce and detect the Θ^+ in electron scattering experiments. Experiments can measure the Θ^+ in both "missing mass" and in "invariant mass".

$$D(e, e'K^- p_s)\Theta^+$$

$$D(e, K^-\Theta^+)e'p \quad \Theta \to K^+ n$$

$$^3\vec{H}e(e, K^-\Theta^+)e'pp \quad \Theta \to K^+ n$$

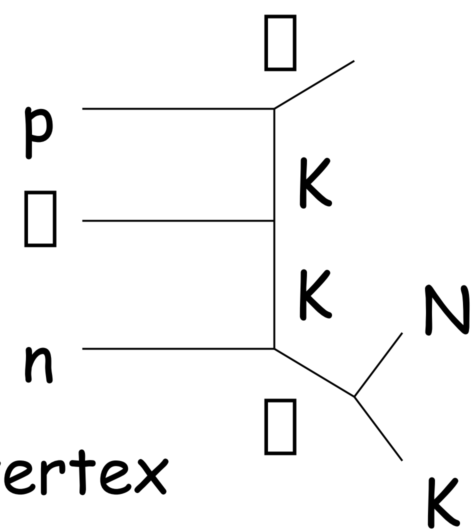
Can measure the width to 2-4 MeV.

JLab Hall A

It may also be possible to measure the spin and parity of the theta in one of the production experiments. by taking advantage of moderate angular coverage of the a spectrometer setting, and looking for interference between the s-wave background and the narrow □.

Related reaction as reported by GRAAL

$$\gamma d \rightarrow \Lambda \Theta^{+}$$



KN to KN vertex

K^+d Scattering

Shmuel Nussinov:

the best limit on the width comes from K+d scattering Data. A careful re-measure of this scattering cross-section Near the □$^+$ is likely to produce the best measure of the Width.

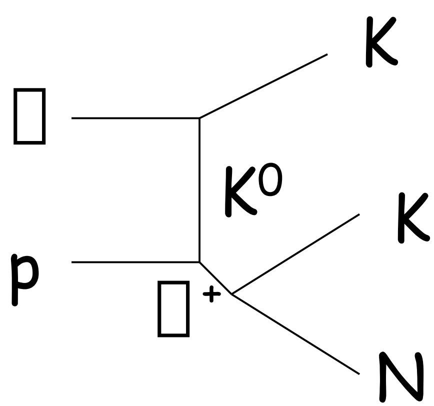


Diagram cannot be important unless

□$_{□}$ > 10-20 MeV

Parity of the □

Look at the decay of the exotic \Xi states to both The □(1320) and the □(1530). The relative rates Can feed back to information on the parity of the □ .

□ ! □(1320)□ Q~400 □ ! □(1530)□ Q~200

$J^P=(1/2)^{(-)}$	L=0	L=2
$J^P=(1/2)^{(+)}$	L=1	L=1

Similarly, what is the ratio of □$_{□}$:□$_{□}$

K⁺d scattering

Eli Piasetzky

Carry out a 2-body low energy Kaon scattering experiment at BNL.

$$K^+ d \;\rightarrow\; \Theta^+ p$$

$$K^+ p \;\rightarrow\; \Theta^+ \pi^+$$

$$\pi^- p \;\rightarrow\; \Theta^+ K^-$$

All of these reactions have the property that □L between the initial and final state depends on the parity of the □ . It is odd for one choice and even for the other.