Nonmesonic decays of Λ and $\Lambda\Lambda$ hypernuclei

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Nonmesonic weak decays of hypernuclei are interesting and challenging. It gives a chance to investigate the weak interaction between baryons. In our study [1,2], we found that the direct quark (DQ) process is important to describe the short range physics, and the well-known n/p puzzle is roughly solved by applying the $\pi + K + DQ$ model for $\Lambda N \to NN$ transition. We extend our model to the $\Lambda\Lambda \to YN$ transition which is one of the decay mode of $\Lambda\Lambda$ hypernuclei. The $\Lambda\Lambda \to YN$ process is very interesting since it has the severe isospin symmetry on the ΛYM vertices. Particularly, for the $\Lambda\Lambda \to \Lambda n$ transition, it is not brought by the π exchange which has the dominant contribution in the usual $\Lambda N \to NN$ transition. Therefore the $\Lambda\Lambda \to \Lambda n$ process enables us to reach the short range physics, at least the kaon exchange mechanism. Another importance is that the $\Lambda\Lambda \to YN$ transition occurs only in the $J = 0$ channel which is hidden by $J = 1$ transition for the $\Lambda N \to NN$ case.
We will report the details of our results at the conference.

References

[1] K. Sasaki, T. Inoue, and M. Oka, Nucl. Phys. A**669**(2000)331; *ibid* A**678**(2000)455(E).
[2] K. Sasaki, T. Inoue, and M. Oka, to be published in Nucl. Phys. **A**.