Search for narrow dibaryon resonances by the $pd \to pdX$ and $pd \to ppX$ reactions

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One of the interesting predictions of QCD is the possibility of the existence of six-quark states, dibaryons. A lot of experimental works have been devoted to the dibaryon search. Among many predicted dibaryons, supernarrow dibaryons are of particular interest. They are considered to have a very narrow decay width ($\leq$1 keV) since two nucleon (NN) decay is forbidden by the Pauli principle and $NN\pi$ decay by the energy conservation law. They are allowed to decay only by electro-magnetic processes.

Recently a group at Moscow Meson Factory has found three supernarrow dibaryon candidates in (p,p') missing mass spectra of the $^2\mathrm{H}(p,p'X)$ reaction at E_p=300 MeV [1]. They used two arm spectrometers made of plastic and BGO scintillators. The observed widths of the resonances were consistent with the experimental mass resolution ($\sim$3 MeV).

In order to draw decisive conclusion for one of the candidates at 1905 MeV, we have performed an experiment at the Research Center of Nuclear Physics, Osaka University [2]. A good mass resolution (0.95 MeV) and background-free condition have been achieved employing a two arm magnetic spectrometer. No signature of a resonance has been found in the $d+\gamma$ or $p+n+\gamma$ decay channel in a mass region of 1896–1914 MeV.

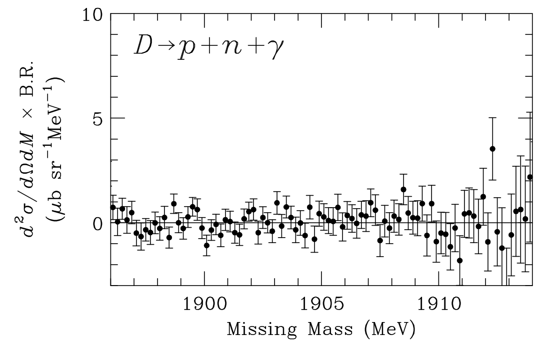

Figure 1: Missing mass spectrum of the dibaryon search for the $p+n+\gamma$ decay channel.

References

[1] L.V. Fil'kov *et al.*, Phys. Rev. C **61** (2000) 044004.

[2] A. Tamii, *et al.*, Phys. Rev. C **65** (2002) 047001.