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

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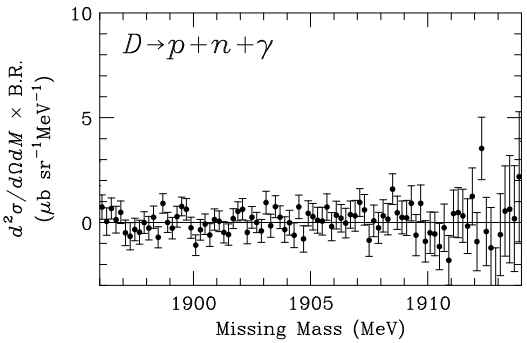
One of the interesting predictions of the QCD is the possibility of the existence of six-quark states, *i.e.* dibaryons. A lot of experimental works have been devoted to the dibaryon search. Among many predicted dibaryons, super-narrow dibaryons are of particular interest. If a dibaryon has a symmetric wave function in terms of two nucleons (NN) and a mass less than that of NN and a pion (π), it cannot decay into NN nor $NN\pi$ due to the Pauli principle and the energy conservation law, respectively. Such dibaryons must decay by emitting a gamma ray, and consequently have a very narrow decay width of less than 1 keV.

Recently a group at Moscow Meson Factory has found three super-narrow dibaryon candidates in the (p,p') missing mass spectra of the ^{2}H$(p,p'X)$ reaction at E_p=300 MeV. They detected scattered protons together with the decay protons from the possible resonances by using two arm spectrometers which consisted of plastic and BGO scintillators. The observed resonance widths were almost equal to the experimental mass resolution ($\sim$3 MeV).

In order to study one of the candidates at 1905 MeV, we have performed an experiment at the Research Center of Nuclear Physics, Osaka University. Although we have achieved a good mass resolution (0.95 MeV) and background-free condition by employing a two arm magnetic spectrometer, no signature of a resonance has been observed over the measured mass range of 1896–1914 MeV as shown in the right figure.



Missing mass spectrum of the dibaryon search for the p+n+γ decay channel.

An improved experiment which covers the mass region of all the three candidates with higher statistics is scheduled in the spring of 2003. we will report on the results of the experiment.