Leading and next to leading CSB operators

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Finally I had the time to study the leading and next to leading diagrams for the dd reaction. I think (PLEASE CHECK) that now I have a complete list. Unfortunately two structures appeared that, if I recall correctly, where not discussed in Seattle or later: First of all there is the one photon exchange in the wavefunctions. Secondly, in the present analysis there is a three body term already at leading order (c.f. Fig. 1a). The photon–π–π vertex here stems from gauging the $\pi\pi NN$ vertex.

In addition at NLO there are 4 loop diagrams – those, however, we already identified in Seattle.

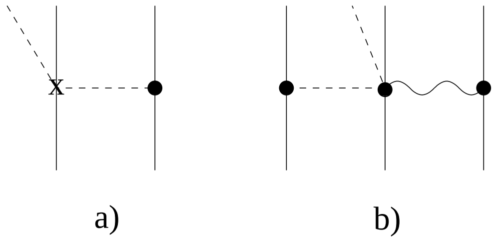

Fig. 1. Leading order two body and three body diagrams. In addition there appear all diagrams with leading CSC strong vertices and a one photon exchange somewhere in the wavefunction. A straight solid line denotes a nucleon, a dashed one a pion and a wavy line a photon. The cross denotes the CSB $\pi\pi NN$ vertex.

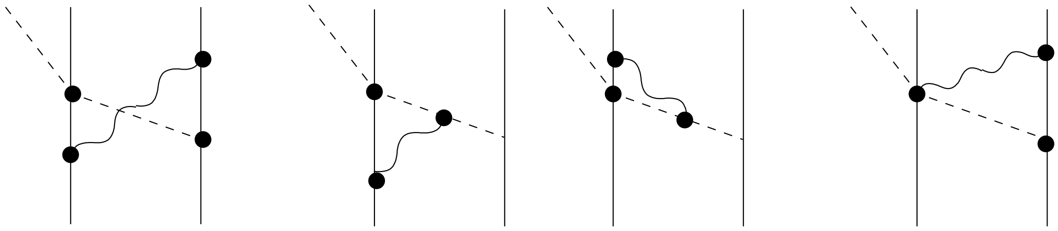

Fig. 2. Next–to–Leading order two body diagrams.

Some of the diagrams of the list that was distributed (e.g. the ones involving the exchange of a heavy meson as well as $\pi\eta$ mixing) appear at NNLO, together with a significant number of more complicated loops as well as three body terms.

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Once this list of leading operators is confired by the collaboration I will start working on their evaluation. Given the order at which the loops appear they all should be finite (for there is no counter term that is non analytic in m_π).

Deltas will only enter in the diagrams where there is a one photon exchange in the wavefunctions together with a direct production. This is acctually very interesting: in case of the 2N system in the s–wave the Delta always largely cancelled the nucelon contribtion. If this is true here as well it would simplify matters significantly, for we would not need to consider and direct production from the recoil of either N or Delta.