Partial wave decomposition of $2\pi-1\pi$ 3NF in $\chi$PT

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As the title of this workshop shows, the first introduction [1] of the three-nucleon force (3NF) was done 50 years ago. Although there are many representations of 3NF up to now, the Fujita-Miyazawa force [1] type of 3NF has been dominantly used in the Faddeev three-body equation. Comparing the data [2–4] of pd scattering in the intermediate energies there are some agreements and disagreements in the cases whether the 3NF is switched on or off. For a long time one expects another 3NF to solve the disagreements. Not only $2\pi$ exchange type of 3NF but $\pi-\rho$ and $\rho-\rho$ was introduced, however, the calculation of the 3NF was applied to only the bound state. The application to the scattering state we need some techniques, especially, the partial wave decomposition [5]. The 3NF generated by the chiral perturbation theory ($\chi$PT) [6] are consistently reproduced under their unique Lagrangian. The Fujita-Miyazawa 3NF already appears in the Next to Next Leading Order (NNLO) of $\chi$PT. Furthermore, $2\pi-1\pi$ diagram of N$^3$LO are in preparing [7]. In my oral it will be shown how to work out the partial wave decomposition for the $2\pi-1\pi$ type of 3NF.