The $pd \to {}^3He\eta$ reaction near threshold

M. Stenmark[a]

[a] *Department of Radiation Sciences, Box 535, S-75121 Uppsala*

The differential cross section for the reaction $pd \to {}^3He\eta$ in the energy region 930-1100 MeV is investigated in a two-step model. The model assumes a pion is produced in a first $NN \to \pi d$ collision and the final eta meson in a second $\pi N \to \eta N$ collision. Part of the angular dependence observed is ascribed to the $\pi N \to \eta N$ amplitude, through its dependence on the P_{11} and D_{13} resonances, but the main structure comes from the ${}^3He$ form factor.
The $NN \to \pi d$ reaction is assumed to be entirely in the forward direction hence giving no angular dependence and thus simplifying the rest of the calculations. The $\pi n \to \eta p$ amplitude is expanded in into partial waves, which are in turn coupled to the S_{11} resonance as well as the two higher resonances P_{11} and D_{13}. All the partial waves of the ${}^3He$ form factor are calculated as well as the total contribution. Fermi motion is taken into account, but does not seem to significantly change the results.
The two-step model by itself is not completely successful in explaining the $pd \to {}^3He\eta$ differential cross section, but its basic features are reproduced.