The final state interaction in the reactions $pp \to \pi^+(np)$ and $pp \to K^+(\Lambda p)$

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The reactions $pp \to \pi^+X$ $(X = np)$ and $pp \to \pi^+d$ were measured simultaneously at $p_{lab} = 1640 MeV/c$ $(T_{lab} = 951 MeV)$ and $\theta = 0^0$ in a high resolution study using the cooler synchrotron COSY and the spectrometer BIG KARL. The missing mass spectrum of the $pp \to \pi^+X$ reaction is analyzed with respect to the (np) final state interaction. A good description of the missing mass spectrum is achieved using the Fäldt-Wilkin extrapolation theorem [1]. There, the triplet (np) continuum wave function is extrapolated to the bound state pole, i.e. the wave function of the deuteron. It is shown that the reaction is dominated by the triplet) (np) state interaction. The singlet contribution is negligibly small. An upper limit of a possible singlet contribution is deduced

The reaction $pp \to K^+X$ $(X = \Lambda p)$ which was measured in a high resolution study at SATURNE II using the spectrometer SPES4 [2] is analyzed with respect to the final state interaction near the Λp production threshold. The observed spectrum can be described by factorizing the reaction amplitude in terms of a production amplitude and a final state scattering amplitude. Parametrizing the Λp final state interaction in terms of the inverse Jost function allows a direct extraction of the low-energy phase-equivalent potential parameters. Constraints on the singlet and triplet scattering lengths and effective ranges can be deduced by fitting simultaneously the Λp invariant mass spectrum and the total cross section data of the free Λp scattering using the effective range approximation. The results are discussed with respect to a similar analysis of the (np) final state interaction in the reaction $pp \to \pi^+X$ $(X = np)$.

[1] G. Fäldt and C. Wilkin, Nucl. Phys. **A604** (1996) 441

[2] R. Siebert et al., Nucl. Phys. **A567** (1994) 819

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