

Meson Production In Pd Fusion To ${}^3\text{He}$ At Proton Beam Momenta Between $P_p = 1.60$ GeV/c And $P_p = 1.74$ GeV/c With Wasa-at-cosy

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The WASA-at-COSY experiment, located at the COoler SYnchrotron COSY of the Forschungszentrum Jülich, Germany, is an internal target experiment used to study hadron physics in pp-, pd- and dd-collisions. A forward detector system allows the reconstruction of nuclear ejectiles like protons, deuterons, or He-nuclei, while a central detector with a near 4π -acceptance can be used to reconstruct mesons and their decay products. One of the aspects of the WASA-at-COSY hadron physics program is the production of pseudoscalar mesons in pd fusion to ${}^3\text{He}$.

The reaction $pd \rightarrow {}^3\text{He}\eta$ has been studied in great detail in the near threshold region, however there still remain open questions regarding the underlying production mechanism as well as recently observed unexpected cross section structures at higher excess energies. As the WASA-at-COSY experiment is perfectly suited to study the energy dependence of both total and differential cross sections, a measurement was performed in May 2014 in order to investigate the excess energy region of interest, covering 15 excess energies ranging from $Q \approx 13.6$ MeV to $Q \approx 80.9$ MeV.

Furthermore, (multi-)pion final states can also be investigated with this dataset with the perspective of significantly extending the current database of differential distributions and total cross sections for the single-, double- and triple-pion production. With this, contributions on several interesting physics cases like the recently observed dibaryon $d^*(2380)$ can be made.

An overview of the possibilities this dataset provides will be given as well as the current status of the analyses regarding these reactions.