

η and η' meson production in free and quasi-free nucleon-nucleon collisions at COSY-11

Joanna Przerwa for the COSY-11 collaboration¹

¹ Institute of Physics, Jagellonian University, Cracow, Poland

The COSY-11 facility equipped with detectors for measurements of neutrons, deuterons, spectator protons and the beam polarisation allows to study spin and isospin degrees of freedom of meson production in nucleon-nucleon collisions and meson-nucleon interactions. The study of the η -proton interaction – the first part of these investigations – has been recently completed [1]. We have observed an unexpectedly large enhancement of the population density in the kinematical regions of the low η -proton relative momenta. This success encouraged us to investigate further the still completely unknown η' -proton interaction. Both, the already elaborated results concerning the η meson production and tentative results from the recent high statistics measurements on the $pp \rightarrow pp\eta'$ reaction will be presented and discussed.

We will also present results of the quasi-free $pn \rightarrow pn\eta$ and $pn \rightarrow pn\eta'$ reactions. The measurement of the quasi-free $pn \rightarrow pnX$ processes is conducted using a proton beam and a deuteron cluster target. The registration of all outgoing nucleons from the $pd \rightarrow p_{sp}pnX$ reaction and application of the missing mass technique allows to identify events with the creation of the meson under investigation. The magnitude and the energy dependence of the total cross section for the $pn \rightarrow pn\eta'$ reaction (in the excess energy range between 0 and 20 MeV) and its comparison with the established excitation function for the $pp \rightarrow pp\eta'$ reaction should allow to investigate aspects of the structure of the η' meson. After presentation of the tentative COSY-11 results for the quasi-free production of the η and η' meson in the proton-neutron collisions obtained at COSY-11 detection setup we will discuss the possibility of extending such investigations to higher excess energies (up to ≈ 150 MeV) using the WASA facility when it will be installed at COSY [2], where the measurements and evaluation methods will be different from the one used at COSY-11.

References:

- [1] P. Moskal et al., Phys. Rev. C **69** (2004) 025203.
- [2] H.-H. Adam et al., Proposal for the WASA@COSY, (2004),
e-print Archive: nucl-ex/0411038

j.przerwa@fz-juelich.de

<http://ikpe1101.ikp.kfa-juelich.de>