Phi-meson Production in pN Collisions Close to Threshold

Yoshikazu Maeda on behalf of ANKE collaboration

Institut fuer Kernphysik, Forschungszentrum Juelich, 52425 Juelich, Germany
[1]Research Center for Nuclear Physics, Osaka University, Ibaraki, Osaka 567-0047, Japan

At the ANKE facility of COSY Juelich, the reactions pp→ppϕ[1] and pn→dϕ[2] have been measured by detecting K^+K^- pairs from the ϕ-meson decay in coincidence with the fast proton and deuteron, respectively. Data for the total cross section in pp-channel have been obtained at the excess energies of 76 MeV, 35 MeV and 19 MeV, being new data points below the energy of DISTO measurement. The reaction pn→dϕ has been measured using a deuterium target at a fixed beam energy 2.65 GeV. First data for the total cross section as well as the energy dependence of differential cross section have been obtained at the excess energies range from 0 to 80 MeV making use the Fermi motion of the target neutron. Production on the neutron is found to be stronger than on the proton but not by as much as for the η-meson. The ϕ polarization, as measured through its K^+K^- decay, shows the early onset of p-waves on the neutron, whereas s-wave part dominates its production at 19 MeV on proton target.

The new ϕ data combined with SPES-III, TOF-COSY and ANKE results on ω-meson production provide additionally the total cross section ratios of ϕ/ω production in pp- and pn-channel. The ratio is found to be similar for both channel, i.e. of about eight times larger than the ratio based on Okubo-Zweig-Iizuka rule (R_{OZI}=4.2x10^{-3}), indicating that in the ϕ/ω cross section ratio for nucleon-nucleon collisions there is no strong dependence on the initial spin state of entrance nucleons, i.e. the spin-triplet state and spin-singlet state in pp- and pn-channel, respectively. The total cross sections as well as the differential distributions for both reactions will be also presented and discussed.

[1]M. Hartmann et al., Phys. Rev. Lett. 96, 242301(2006).
[2]Y. Maeda et al, submitted to Phys. Rev. Lett.

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[1] Present address