eta meson physics at GEM

Piotr Hawranek
for the GEM collaboration

Instytut Fizyki, Uniwersytet Jagielloński
Cracow, Poland

Some experimental studies of η production and η interactions performed or presently under way by the GEM collaboration at COSY Juelich are reviewed. The Germanium Wall a stack of annular detectors made of high purity germanium was used to measure a series of differential and the total cross sections for η production with proton and deuteron beams and light targets. The results for $p + d \rightarrow {}^3He + \eta$ and $\vec{d} + d \rightarrow {}^4He + \eta$ reactions will be presented and the plans for η bound state studies in ${}^7Be$ system will be discused. The unique combination of high resolution magnetic spectrograph (BIG KARL) and the electron cooled beam delivered by COSY is ideally suited to perform a high precision experiments like η mass determination. In this self calibrating experiment three particles from two reactions were detected simultaneously. Kinematical coincidence of ${}^3H$ and π^+ from $p + d \rightarrow {}^3H + \pi^+$ reaction allowed to calibrate the spectrograph and determine the beam momentum with great accuracy. The η meson was seen clearly as a sharp missing-mass peak on a slowly varying background in the $p + d \rightarrow {}^3He + X$ reaction. A new value for the η mass has been derived with extremely small error bars.

E-mail: hawranek@if.uj.edu.pl