Near threshold η-meson production in the dd$\rightarrow$^{4}He$\,\eta$ reaction

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The issue of η-nucleus quasi-bound states has drawn a lot of attention in recent years. A steep rise of the η-production amplitudes in the pd $\rightarrow$^{3}He$\,\eta$ and dd $\rightarrow$^{4}He$\,\eta$ processes is believed to be an indication for such systems. However, an advanced analysis aiming at the extraction of the η-nucleus s-wave scattering length requires precise information on angular distributions, in particular on the contribution of the s-wave amplitude to the total cross section. For the pd $\rightarrow$^{3}He$\,\eta$ reaction, though some differential cross sections for higher Q values (Q>21 MeV) are available, there are still inconsistencies between various data sets on the total cross section close to threshold (for a review see [1]). Angular distributions for the ^{4}He$-\eta$ system have never been measured and the existing data on the total cross section [2,3] cover the energy regime up to Q=8 MeV. Knowlegde of the influence of higher partial waves would also cast some light on the η-production mechanism.

Investigation of the dd $\rightarrow$^{4}He$\,\eta$ reaction has been a part of the experimental programme at the ANKE facility of COSY-Jülich [4]. It comprises measurements at four excess energies: 2 MeV, 7 MeV, 22 MeV, 43 MeV as well as an energy below threshold for background study. For the first two energies total and differential cross sections have been extracted, data for higher energies are still under analysis. The results obtained so far as well as the employed experimental technique will be presented.

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