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The η-meson decay program at WASA-at-COSY

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The study of η-decays allows to probe symmetry-breaking phenomena, to test theoretical calculations and to explore the anomalous sector of QCD. In order to perform those studies two data samples have been acquired with the WASA-at-COSY facility at Forschungszentrum Juelich. A proton beam is accelerated within the COSY storage ring towards a liquid deuterium or a liquid hydrogen pellet target producing η-mesons via: pd ⟶ 3He η or pp ⟶ ppη. The η-decay products as well as the forward-scattered projectiles are detected within the 4π WASA-at-COSY detector. A first round of experiments was done with the pd ⟶ 3He η reaction used for the study of the more abundant η-decay channels and to set up the framework for a common analysis. In order to address the rare η-decays a high-statistics data set has been collected in the reaction pp ⟶ ppη. The current analysis of the pp ⟶ ppη data set is related to the following decay modes of the η-meson: η ⟶ π+π-π0 is isospin violating and allows to probe quark masses. η ⟶ e+e-γ and η ⟶ e+e-e+e- serve to determine the electromagnetic transition form factor. C-violation can be tested via η ⟶ π0e+e-. The radiative decay η ⟶ π+π-γ is sensitive to the box anomaly. This talk will give an overview about the status of the analyses.

Primary author: LERSCH, Daniel (Juelich Research Center Germany)

Co-author: WASA-AT-COSY COLLABORATION

Presenter: LERSCH, Daniel (Juelich Research Center Germany)

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