

Hadronic decays of the ω meson

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The status of the ω meson hadronic decays studies carried out by the WASA-at-COSY collaboration in the $p + d \rightarrow {}^3\text{He} + \omega$ reaction close to threshold will be reported. The detector setup allows for precise reconstruction of the recoiling ${}^3\text{He}$ and both the neutral and the charged decay products of the ω .

With the recently collected data we aim to study the two most probable hadronic decays of the ω meson, $\omega \rightarrow \pi^+ \pi^- \pi^0$ and $\omega \rightarrow \pi^+ \pi^-$.

For the 3π decay channel, the decay mechanism can be studied using the density distribution in the Dalitz plot of the final state particles. Previous measurements of such a plot are of limited statistics [1]. This experiment will provide a high-statistics Dalitz plot that will allow for convincing tests of theoretical predictions of the decay mechanism and final state interactions.

The value of the branching ratio of the isospin violating 2π decay channel is mainly given by results from e^+e^- experiments [2]. In that production method there is a strong $\rho - \omega$ interference, due to the coherent addition of the ρ and ω amplitudes. However in hadronic productions these amplitudes add mainly incoherent, allowing for a clearer separation of the ω and ρ final state. Thus, the experimental method used by the WASA-at-COSY collaboration will provide an independent verification of the ω two pion decay branching ratio.

[1] M. L. Stevenson et al., *Phys. Rev.*, **125**, 687, (1962)

[2] K. Nakamura et al. (Particle Data Group), *Journal of Physics G37*, 075021 (2010) and 2011 partial update for the 2012 edition.

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