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Symmetry Breaking and Transition Form Factor from eta and omega Decays

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The physics goals of the WASA-at-COSY collaboration are based on meson production and decays. One has to analyse different rare decay channels of the mesons to fulfill the physics motivation of finding the symmetry breaking patterns. The combination of high intensity COSY (COoler SYnchrotron) beams and the WASA 4pi detector setup allows us to measure the rare decay channels of light mesons.
We are analysing different symmetry breaking decay channels of eta mesons . One rare decay channel eta->pi+pi− e+ e- has been used to test the CP violation. The asymmetry in the angle between the electron and pion planes gives insight about the degree of CP violation. The study of another rare decay channel eta->pi0 e+ e- helps to test C-parity violation.

Our analysis of transition form factors of different mesons through their conversion decays (eta->gamma*gamma->e+e-gamma, omega->pi°gamma->* pi°e+e-) provide insight about the hadron structure. Transition form-factor of omega meson provides information about the form factor in the time-like region where the two vectors particles (the omega and the intermediate virtual photon) have an invariant mass squared significantly greater than zero. The interesting point is that the prediction of vector meson dominance for transition form factor of pseudoscalar meson decays agree but the same for the omega meson decays deviate from the prediction by vector meson dominance.

In this presentation we will report about preliminary results for different symmetry breaking channels as well as for the transition form factor of eta mesons. Very first results from pilot experiments where omega mesons have been produced will be shown.

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