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Experimental study of Lambda(1405) resonance via kaon-induced reactions on deuteron

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There are long-standing arguments on a meson-baryon aspect of the Lambda(1405) resonance. In particular, pole structure of Lambda(1405) has been intensively discussed. Since Lambda(1405) is located below the antikaon-nucleon (KbarN) mass threshold, it is impossible to form Lambda(1405) directly in the KbarN scattering in free space. Therefore, we carried out an experiment to measure spectral shapes of Lambda(1405) in the $d(K^-,n)\pi\Sigma$ reactions at J-PARC. In this reaction, a neutron is knocked out from a deuteron by an incident K^- and a recoiled \bar{K} reacts with a residual nucleon decaying into a pion (π) and a Sigma hyperon. In the case of the knocked-out neutron emitted at a forward angle, the recoiled kaon momentum is as low as about 250 MeV/c. This reaction is expected to enhance an S-wave KbarN scattering even below the KbarN mass threshold since the recoiled Kbar and/or the residual nucleon could be off-shell. We successfully measured π -Sigma mass spectra below and above the KbarN mass threshold. We will discuss KbarN scattering amplitude deduced from the measured spectra.

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