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The role of the triangle singularity in Λ(1405) production in the $\pi^- p \to K^\circ \pi\Sigma$ and $pp \to pK^+\pi\Sigma$ processes

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We have investigated the cross section for the $\pi^- p \to K^0\pi\Sigma$ and $pp \to pK^+\pi\Sigma$ reactions paying attention to a mechanism that develops a triangle singularity. The triangle diagram is realized by the decay of a N^* to $K^*\Sigma$ and the K^* decay into πK, and the $\pi\Sigma$ finally merges into $\Lambda(1405)$. The mechanism is expected to produce a peak around 2140 MeV in the $K\Lambda(1405)$ invariant mass. We found that a clear peak appears around 2100 MeV in the $K\Lambda(1405)$ invariant mass which is about 40 MeV lower than the expectation, and that is due to the resonance peak of a N^* resonance which plays a crucial role in the $K^*\Sigma$ production. The mechanism studied produces the peak of the $\Lambda(1405)$ around or below 1400 MeV, as is seen in the $pp \to pK^+\pi\Sigma$ HADES experiment.

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