We discuss the mechanisms of $\Lambda(1405)$ production in the $\pi^+p \rightarrow K^0\pi\Sigma$ reaction. We find two mechanisms, which lead to very different shapes of the $\pi\Sigma$ mass distributions. The combination of them gives a good description of experimental measurements.

**Motivation : Two poles?**

There are two poles of the scattering amplitude around nominal $\Lambda(1405)$ energy region.

- **Cloudy bag model** (1990)
  - Fink et al. PRC41, 2720

- **Chiral unitary model** (2001–)
  - Oller et al. PLB500, 263
  - Oset et al. PLB527, 99
  - Jido et al. PRC66, 025203
  - Hyodo et al. PRC68, 018201

**Model for the reaction**

We consider the limit where the final $K^0$ is almost at rest.

**Chiral term**

Initial c.m. energy of $\pi^+p$ system $\sim 1.9$ GeV

- $\rightarrow$ nucleon resonance excitation in the initial stage:
- $\rightarrow$ $\pi N$ decay data

**N(1710) contribution**

- Effective chiral Lagrangian
- Chiral unitary model

**Numerical results**

Experiment : D. W. Thomas, et al., NPB56, 15 (1973)

**Conclusions**

- We calculate the $\pi^+p \rightarrow K^0\pi\Sigma$ reaction using the chiral unitary model.
- There are two mechanisms in the initial stage interaction.
- They filter each one of the resonances.
- Combination of the two mechanisms gives a good description of data.

T. Hyodo, et al., nucl-th/0307005