Spin and Parity of the $\Lambda(1405)$ Baryon

- $\Lambda(1405)$ is a well-known hyperon (PDG Status: ****)
- Spin-Parity, $J^P$, has never been definitively measured
- $\Lambda(1405)$ created polarized via photoproduction in liquid hydrogen & detected in CLAS

$$\gamma + p \rightarrow K^+ + \vec{\Lambda}(1405)$$

$$\vec{\Lambda}(1405) \rightarrow \Sigma^+ + \pi^-$$

- Isotropic decay of $\Lambda(1405)$ is consistent with spin $J = \frac{1}{2}$
- Polarization transfer to $\Sigma^+$ direction reveals $J^P = \frac{1}{2}^-$ vs. $J^P = \frac{1}{2}^+$
- Quark model expectation confirmed
- Higher spins are disfavored by the data and by theoretical expectations