Measurement of the form factors in semileptonic decays of Λ_c

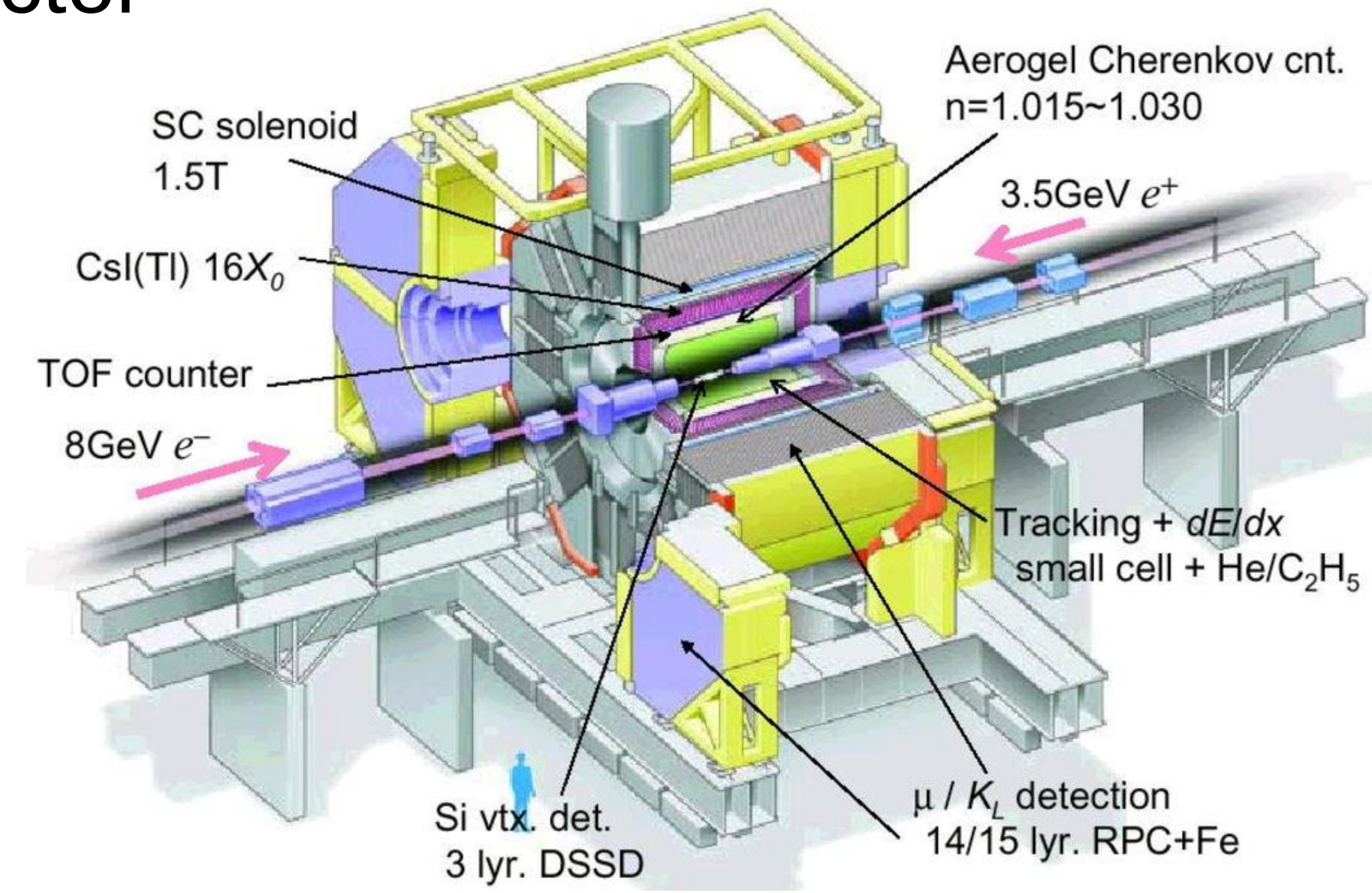
Relevance

- Test of Heavy Quark Effective Theory (HQET) predictions in the charm baryon sector
- Test of lattice QCD
- Information for the determination of CKM matrix elements $|V_{ub}|$ and $|V_{cb}|$ in Λ_b^0 decays

Belle detector

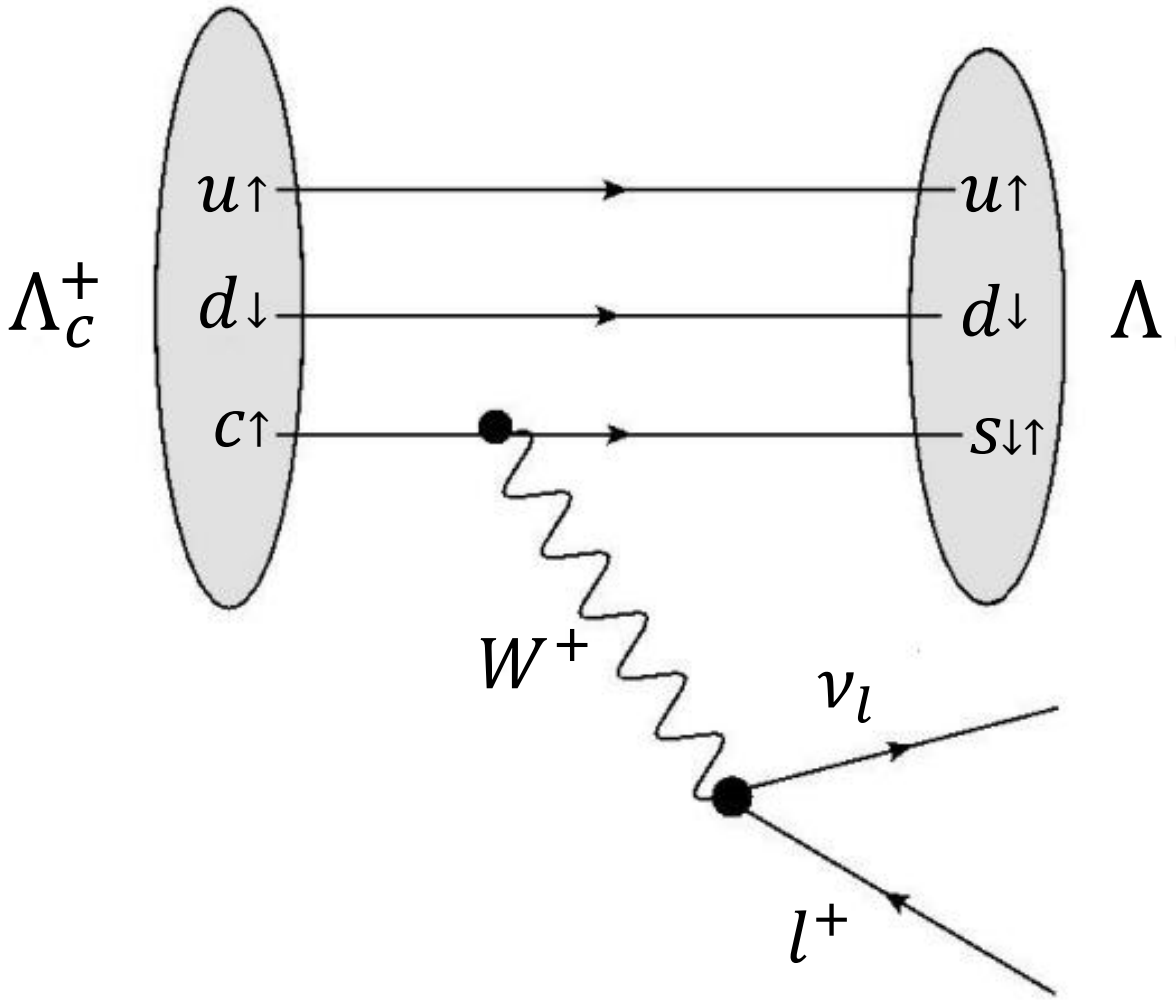
$\sqrt{s} = 10.58\ \mathrm{GeV}$

$L_{\mathrm{int}} \sim 1\ \mathrm{ab}^{-1}$



$\Lambda_c^+ \to \Lambda l^+ \nu_l$ in HQET

In the case of semileptonic transition from heavy to light quark only two independent form factors, $f_1(q^2)$ and $f_2(q^2)$, are required

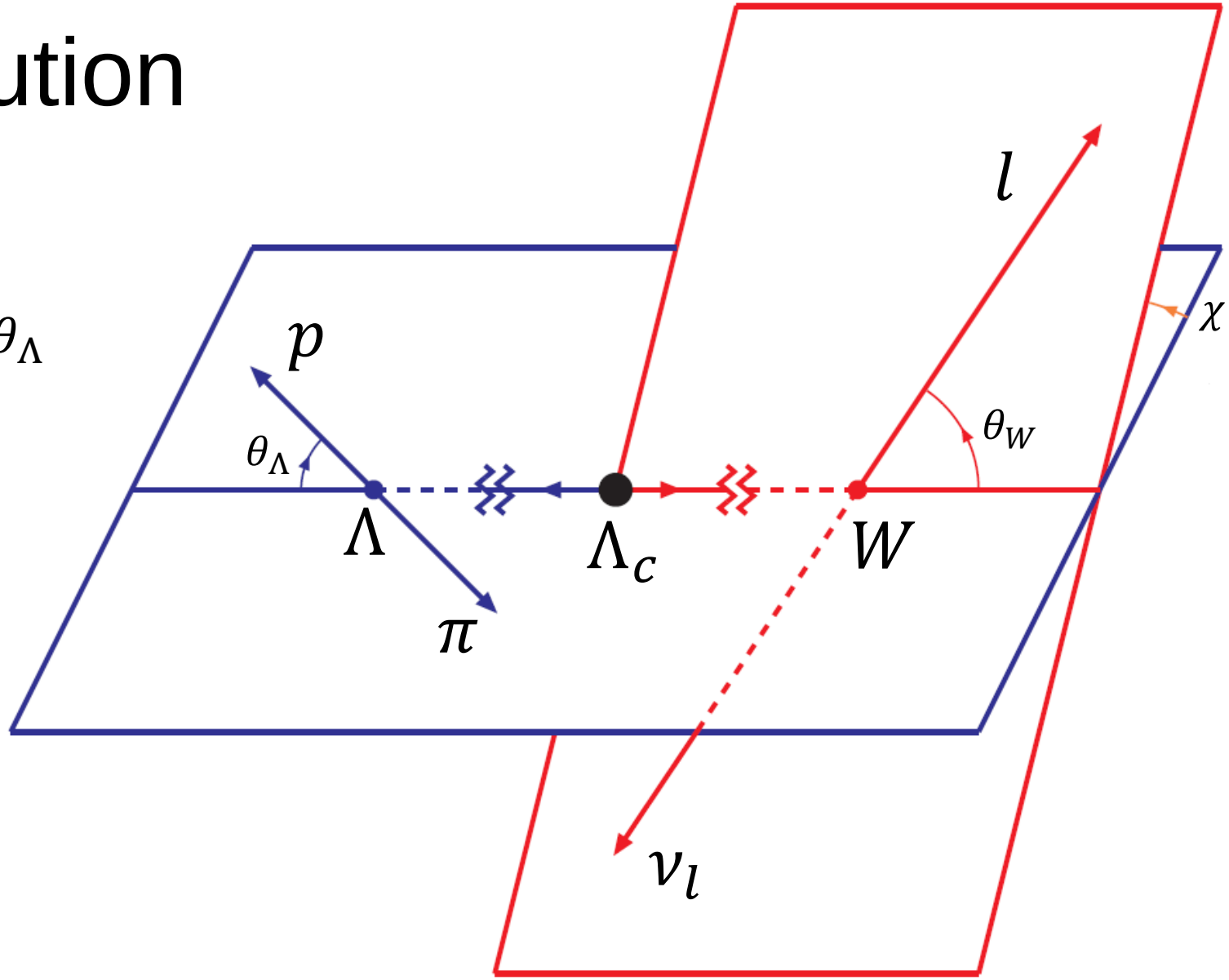


Angular distribution

$$\frac{d\Gamma}{dq^2 d\cos\theta_\Lambda} = 1 + \alpha_\Lambda \alpha_{\Lambda_c} \cos\theta_\Lambda$$

$\alpha_\Lambda \approx 0.64$

$\alpha_{\Lambda_c}(q^2, f_1, f_2)$



CLEO experiment

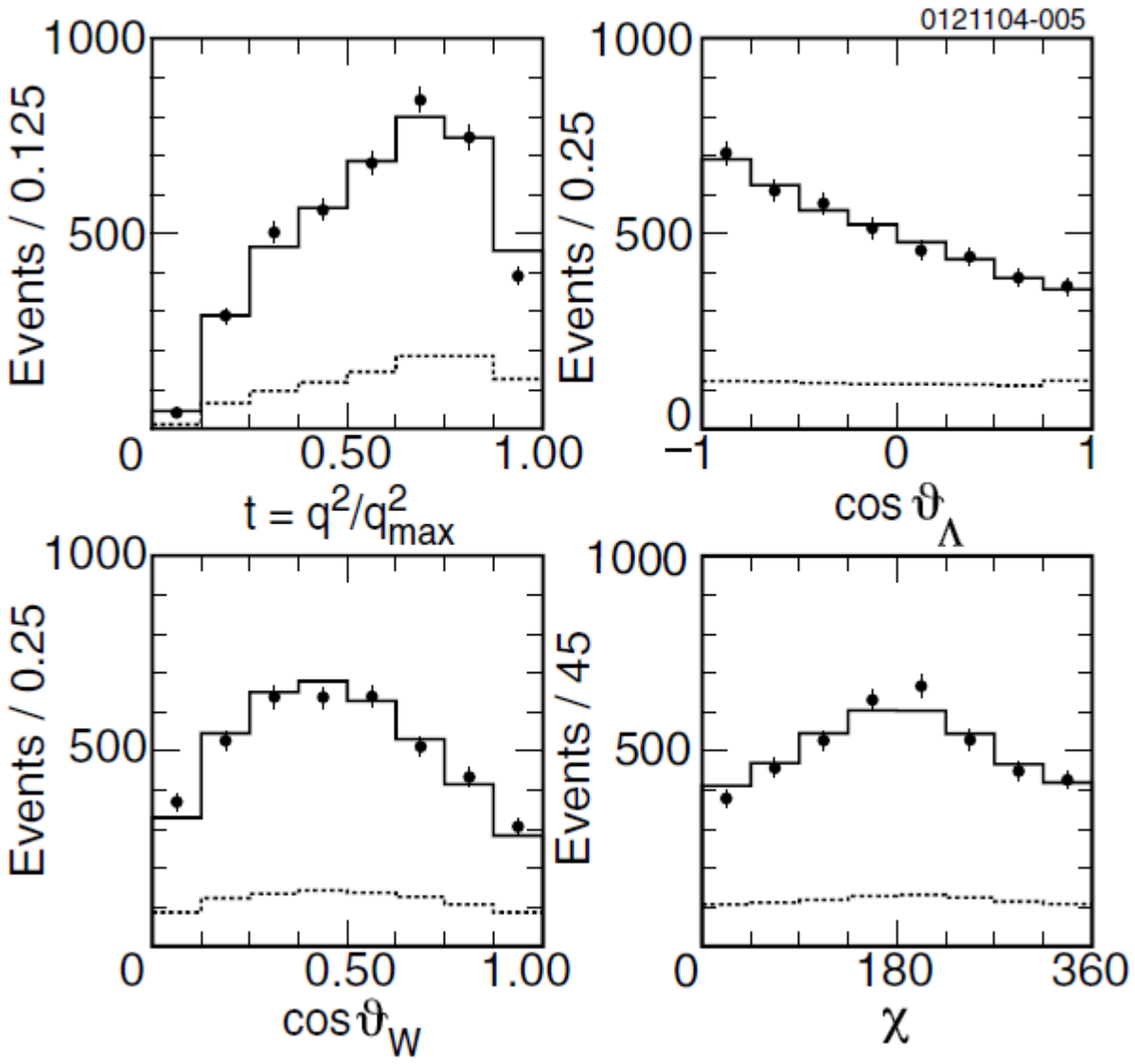
$$f = \frac{f(q^2_{max})}{\left(1 - \frac{q^2}{M^2_{pole}}\right)^2}\left(1 - \frac{q^2_{max}}{M^2_{pole}}\right)^2$$

$$\langle q^2 \rangle = 0.67\ \mathrm{GeV}^2$$

$$R = \frac{f_2}{f_1} = -0.31 \pm 0.07$$

$$\alpha_{\Lambda_c} = -0.86 \pm 0.04$$

$$M_{pole} = 2.21 \pm 0.16\ \mathrm{GeV}$$



Objectives

1. Make a selection of the semileptonic decay $\Lambda_c^+ \to \Lambda l^+ \nu_l$ with $\Lambda \to p\pi^-$
2. Define the polarization of Λ_c^+ and Λ
3. Measure form factors