

Theta -Tau Rätzel

In 1956, parity conservation as well as T and C symmetry was a “dogma”

→ very little experimental tests done

θ/τ puzzle:

$$\theta \rightarrow \pi^+ \pi^0; \quad P(\pi^+ \pi^0) = +1$$

$$\tau \rightarrow \pi^+ \pi^+ \pi^-; \quad P(\pi^+ \pi^+ \pi^-) = -1$$

$$P(q) = 1; P(\bar{q}) = -1;$$

$$P(\text{meson}) = P_q P_{\bar{q}} (-1)^L;$$

lowest energy, $S = 0$

$$P = -1$$

θ , τ have same mass, same lifetime, however different parity ...

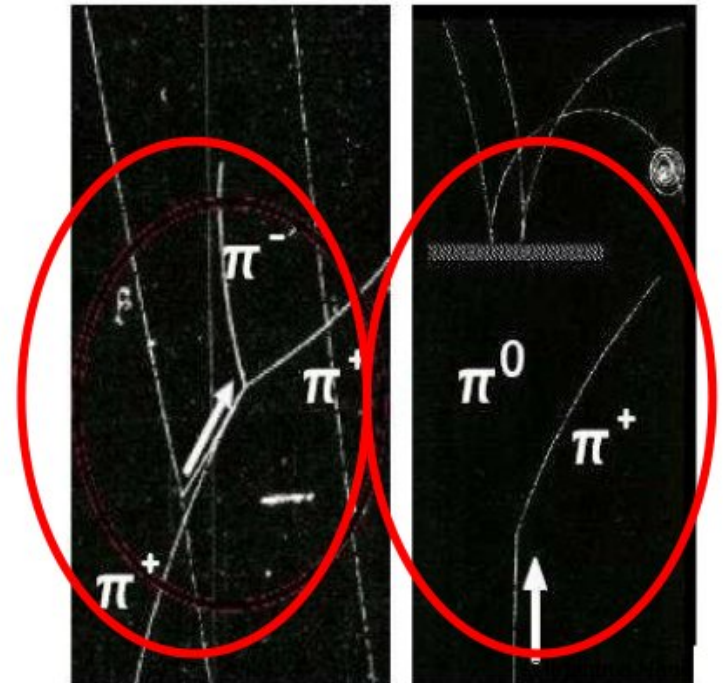
Yang, Lee:

$$\rightarrow \theta = \tau = K^+$$

weak interaction violates parity

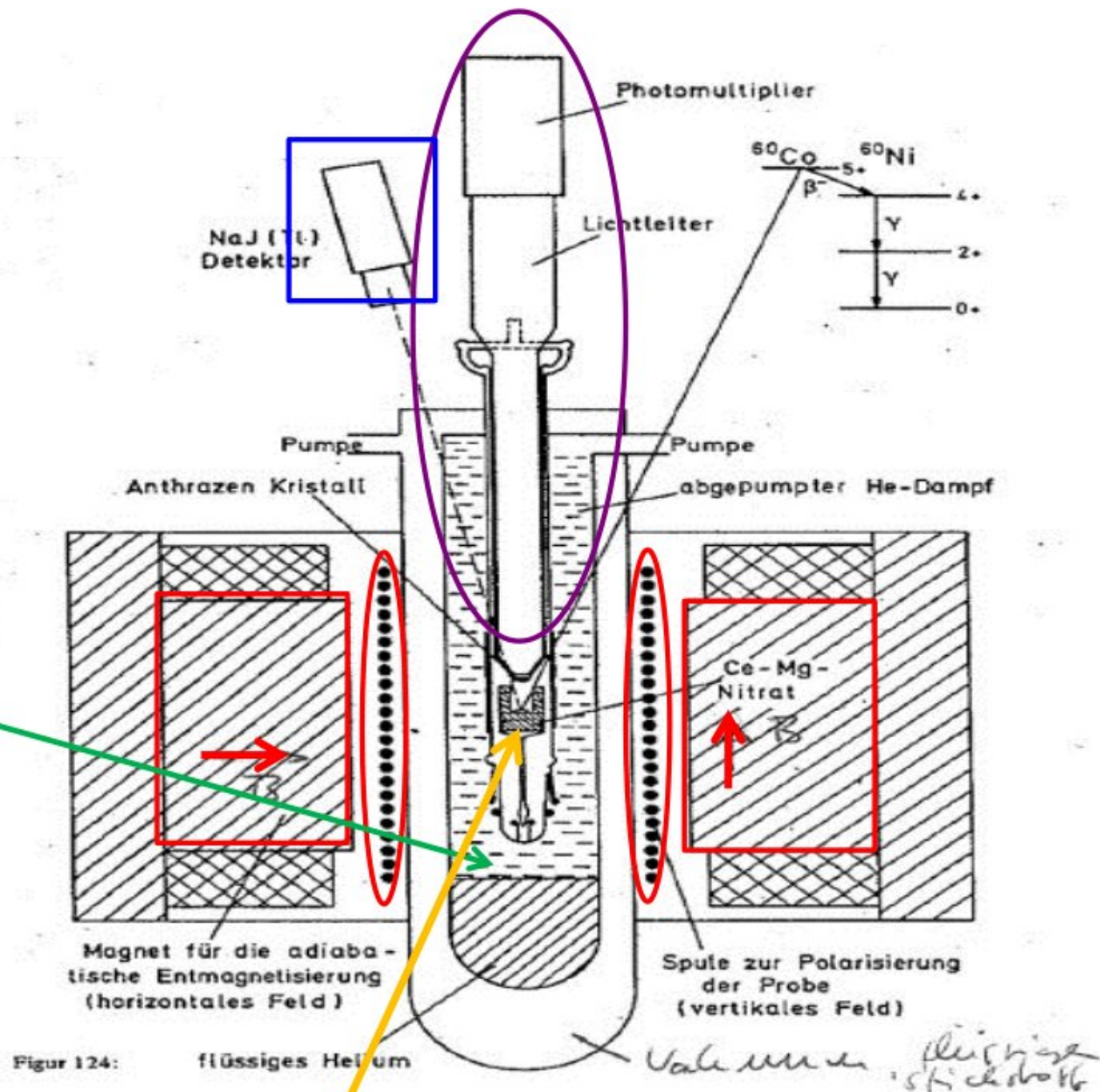
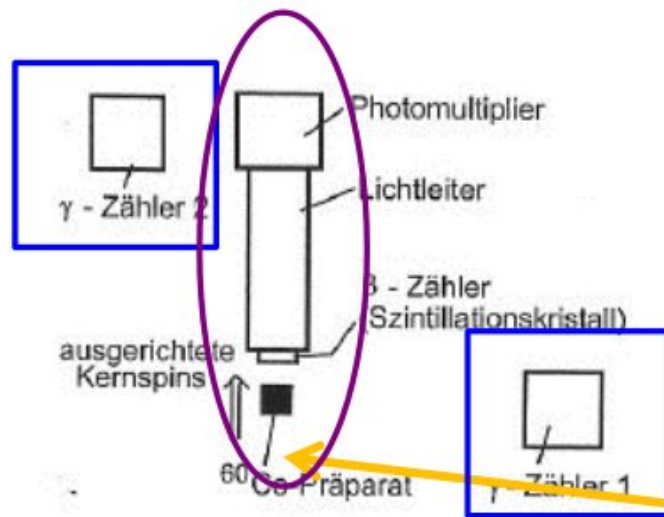
proposed a set of measurements which

test parity



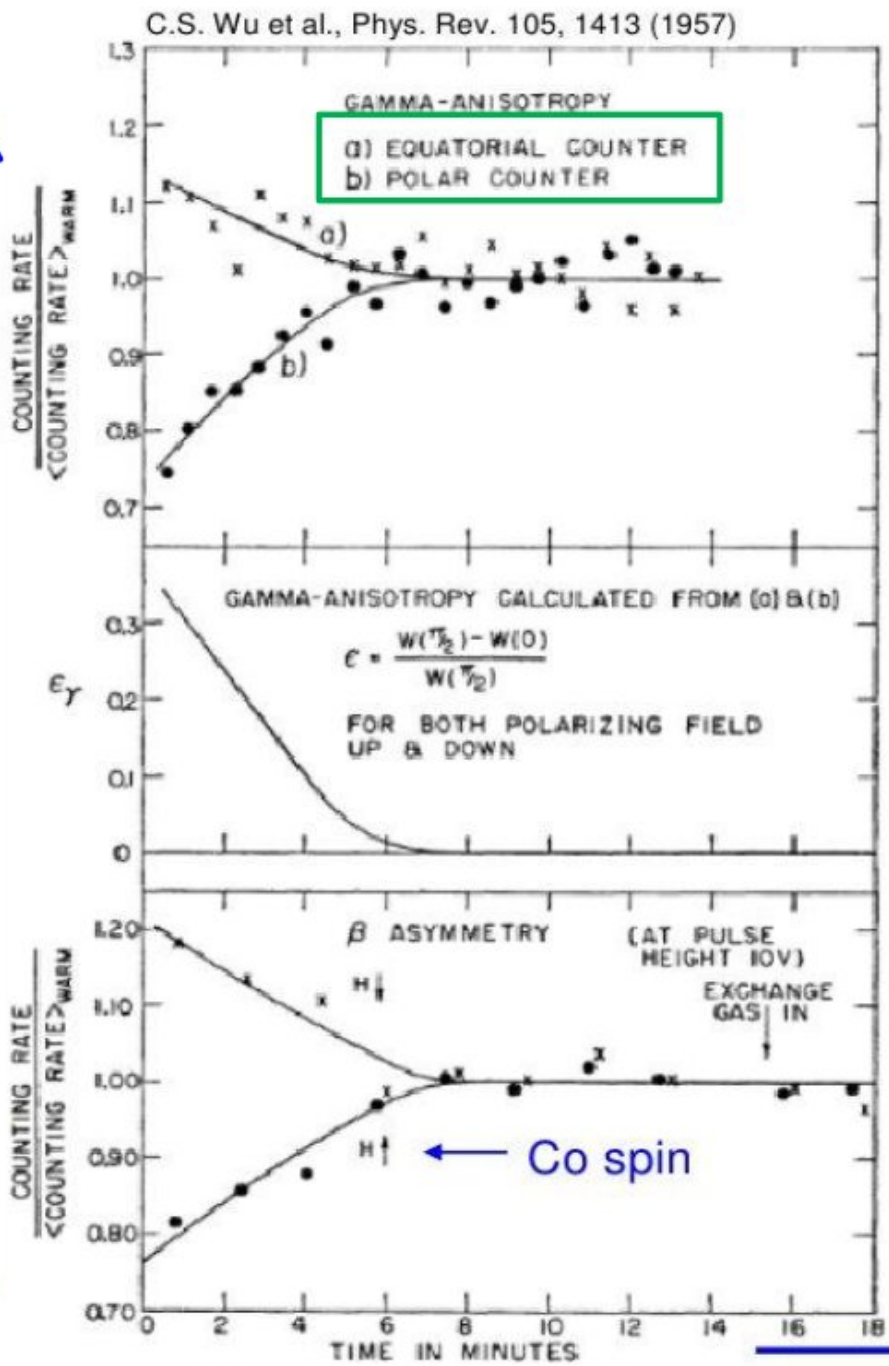
Requirements:

- 2 B fields in orthogonal directions
- detection of emitted electron
(cover a small opening angle Θ)
- detection of emitted gamma
(to test polarization of ^{60}Co)
- crystal needs to be located in helium bath first than in vacuum



Ergebnisse: Wu-Experiment

counting rate relative to warm (unpolarized) rate



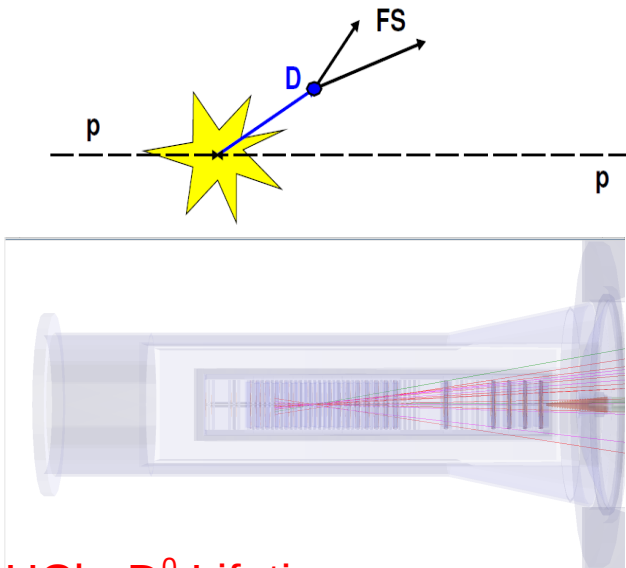
measure photon anisotropy, to determine degree of polarization

electron rates are different depending on the polarization!

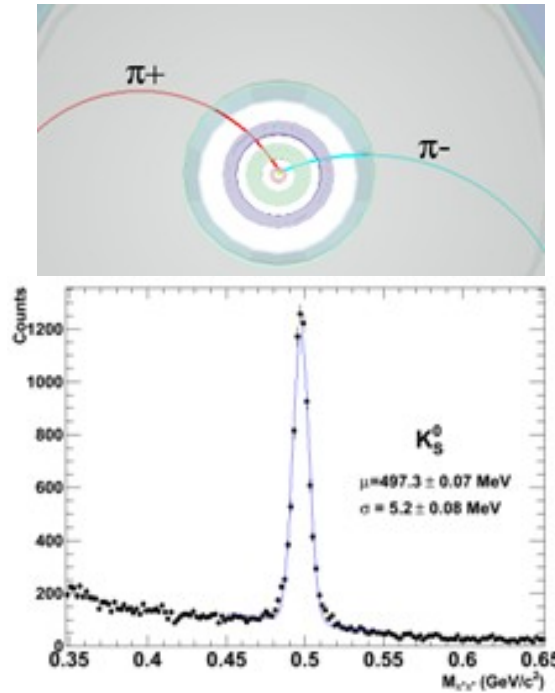
warm up with time

Teilchenphysik-Hands-on-Day

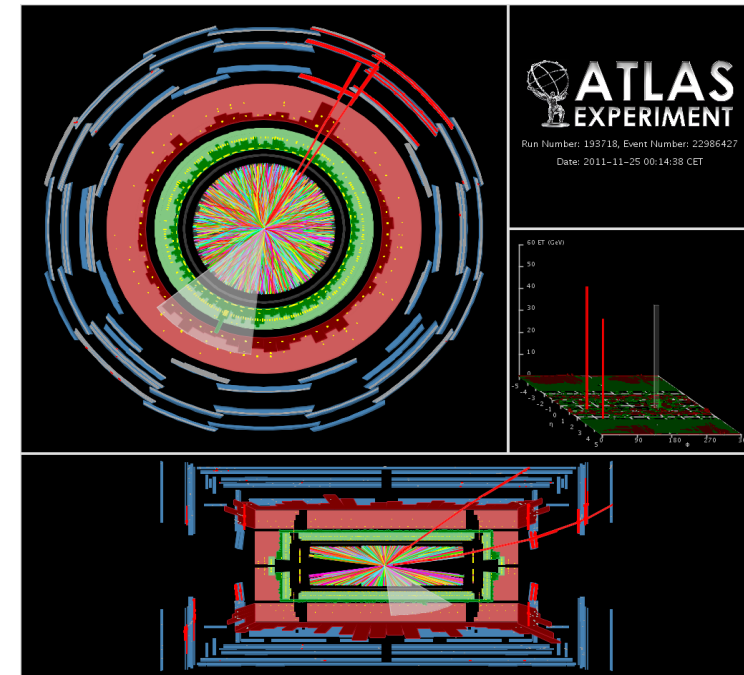
Analysieren von Daten der LHC Experimente



LHCb: D^0 Lifetime measurement



ALICE: Strangeness production



ATLAS: Rediscover the Z

Besichtigung der Labore der Heidelberger Teilchenphysikgruppen

- Bau von $6 \times 5 \text{ m}^2$ großen Spurkammern aus szintillierenden Fasern für den LHCb Upgrade
- Bau des Transition Radiation Detectors (TRD) für das ALICE Experiment
- Bau eines leichten Hochpräzisions-Siliziumdetektors für die Suche nach Leptonzahlverletzung ($\mu 3e$ Experiment)
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Doodle auf nächstem Übungsblatt für (unverbindliche) Interessensbekundung/Terminabfrage [Termine in den Semesterferien in der Woche 16.-20.03. oder 30.03. - 02.04. (Karwoche)]