Theta -Tau Rätsel

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

$\rightarrow$ very little experimental tests done

θ/τ puzzle:

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

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

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

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

lowest energy, $S = 0$

P=-1

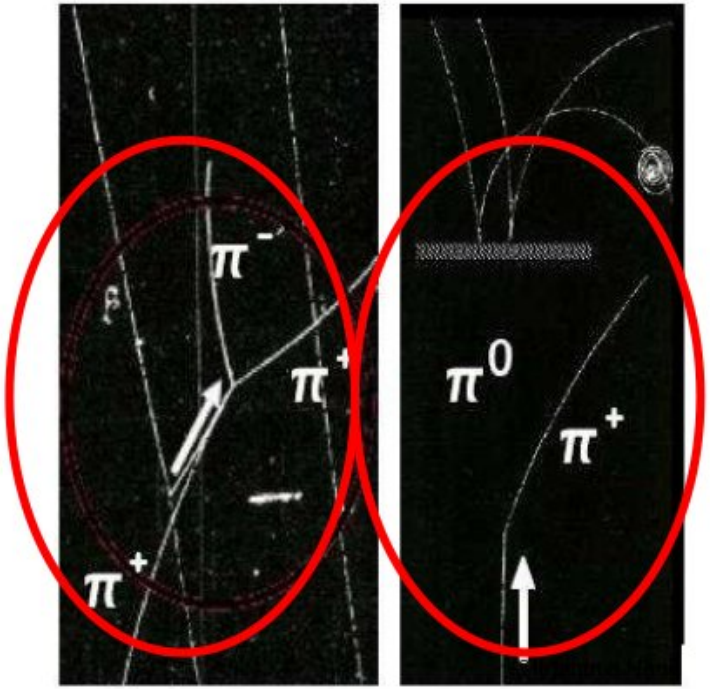
θ, τ have same mass, same lifetime, however different parity ...

Yang, Lee:

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

weak interaction violates parity

proposed a set of measurements which test parity



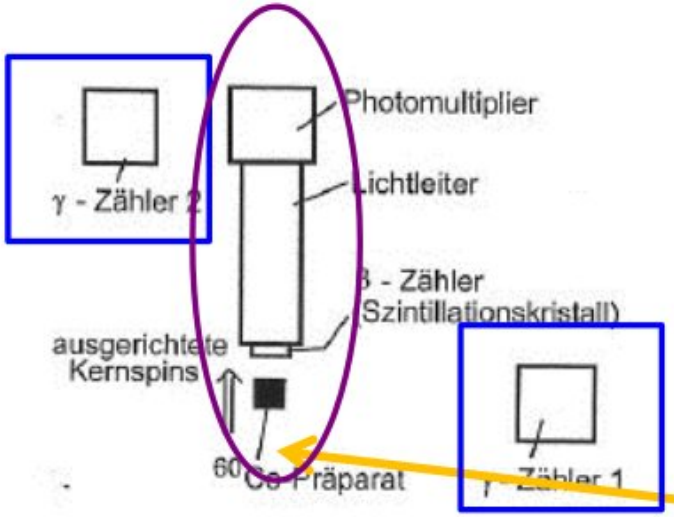
Requirements:

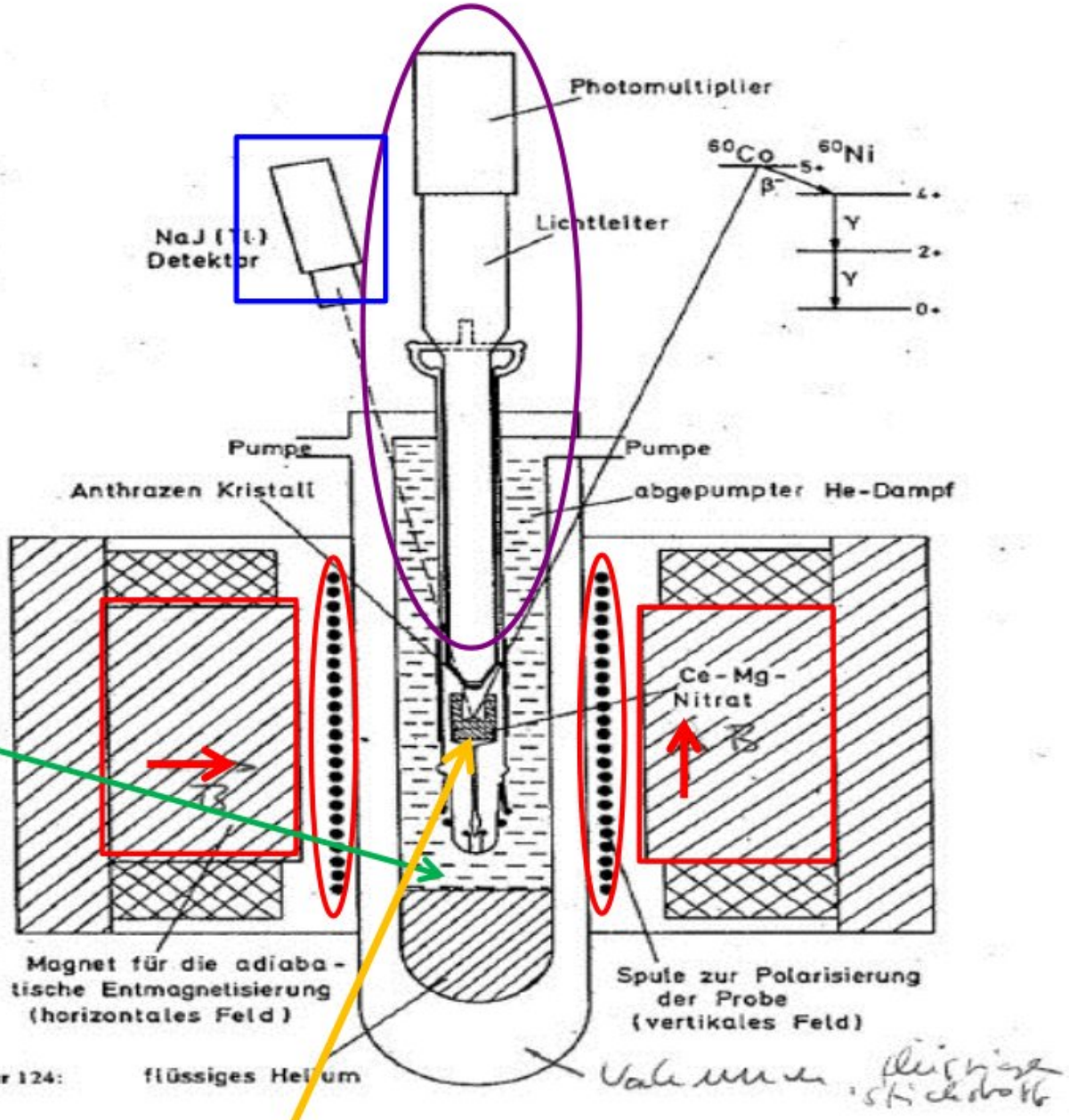
- 2 B fields in orthogonal directions

- 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

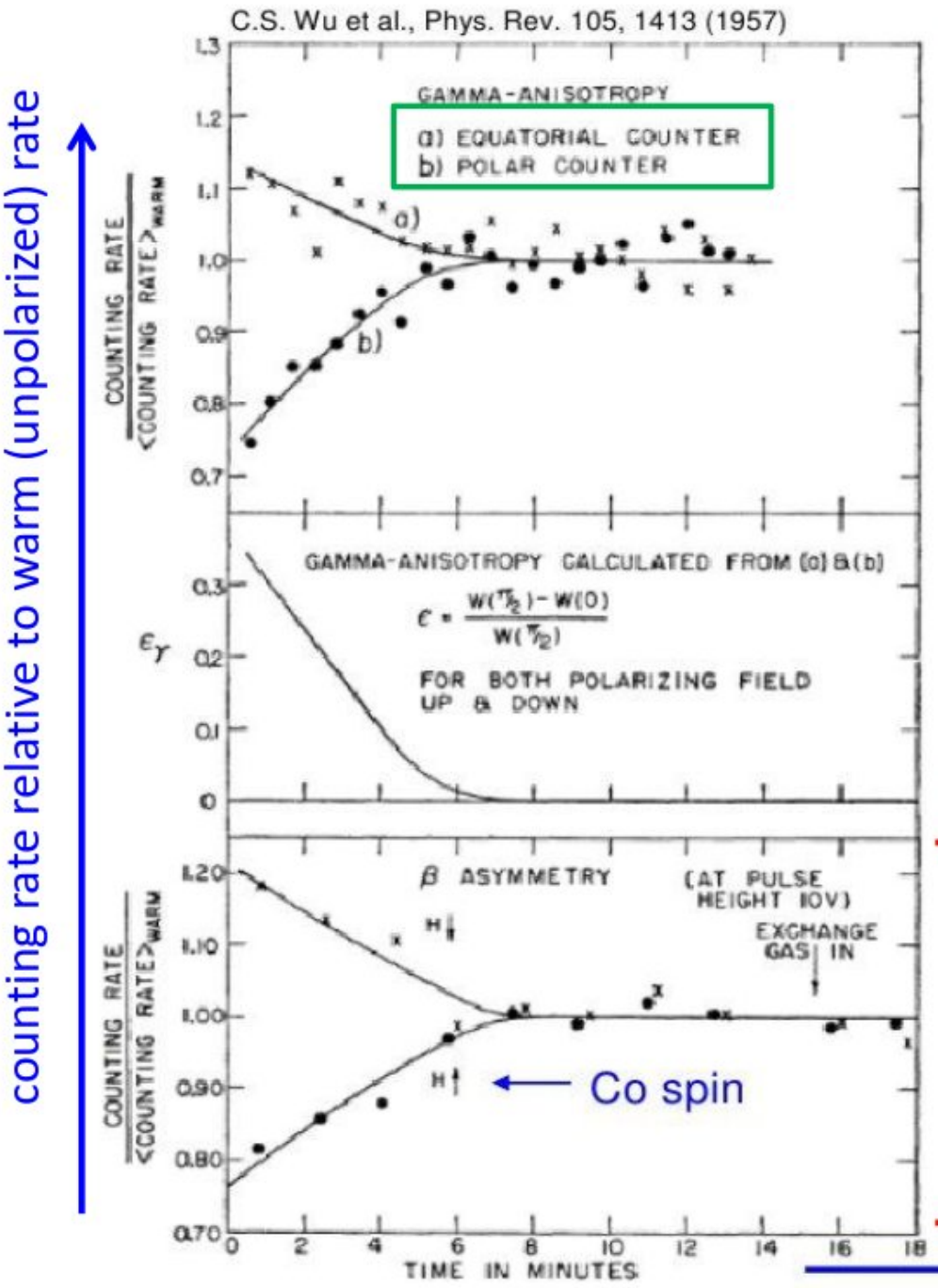




Figur 124:

^{60}Co

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