

Quantum

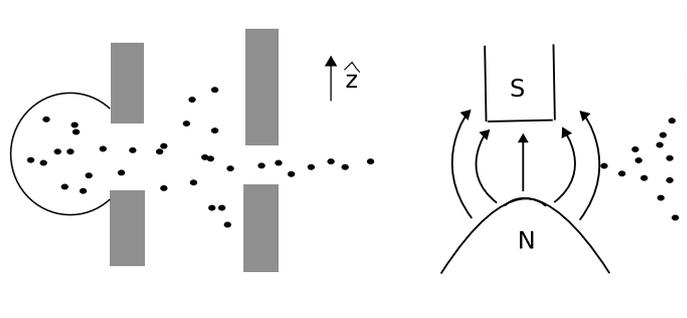
Stern-Gerlach experiment

Stern's idea : 1921

Stern, Gerlach did it , 1922

- 2 state system

1. Heat Ag atoms in oven



2. Collimate the beam

3. Put in homogeneous magnetic field in \hat{z}

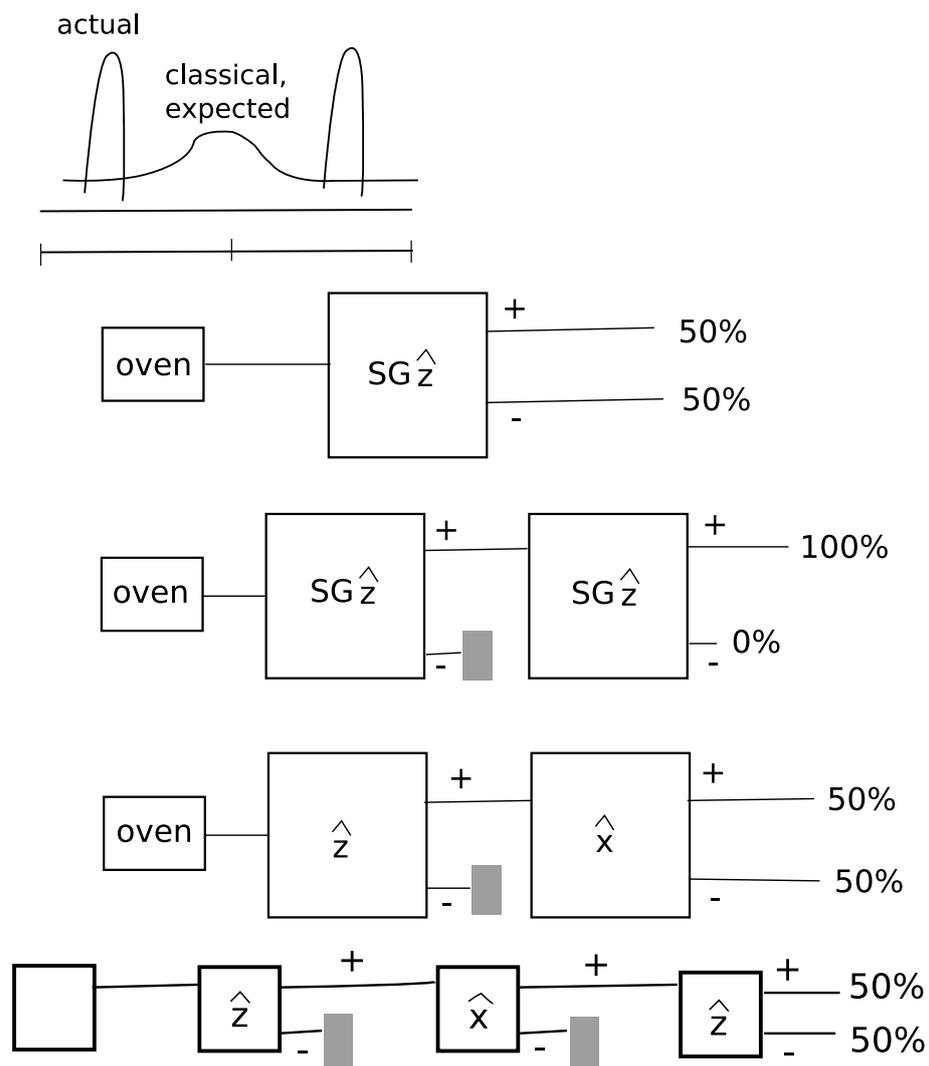
4. ?

Ag: 47 e^- 's, 46 are in orbits 1,2,3,4

1 in 5s

5s e^- : possibly magnetic moment μ

$$F_z = \frac{\partial}{\partial z}(\vec{\mu} \cdot \vec{B} \cong \mu_z \frac{\partial B_z}{\partial z})$$



$$\vec{\mu}\alpha\vec{S} \longrightarrow S_+, S_-$$

$$\begin{cases} S_+ = \frac{\hbar}{2} \\ S_- = -\frac{\hbar}{2} \end{cases}$$

$$S_{\pm} = \pm \frac{\hbar}{2} \quad \hbar = \frac{h}{2\pi} = 6.5822 \times 10^{-16} \text{ eV} \cdot \text{s}$$