Summary

- Stern-Gerlach experiment revealed that an electron has an intrinsic property of spin angular momentum (or simply spin)
- It follows the general definition of AM in QM, i.e. the commutation relations
- Electron spin takes on $s = 1/2$, i.e. the magnitude of spin AM is $\sqrt{\frac{3}{4}}\hbar$. Components along a direction can only be $+\frac{1}{2}\hbar$ or $-\frac{1}{2}\hbar$.
- $\hat{S}_x$, $\hat{S}_y$, $\hat{S}_z$ can be expressed as 2×2 matrices and they are closely related to the Pauli matrices σ_x, σ_y, σ_z.

- Spin is a QM playground due to its mathematical simplicity
- Spin can be used to illustrate general principles of QM, including measurement theory
- Electron at rest in a magnetic field as an interaction energy due to spin magnetic dipole moment. Time-dependent of an arbitrary initial spin state can be obtained via TDSE. Expectation value $\langle \hat{S} \rangle$ shows Larmor precession.

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after general angular momentum