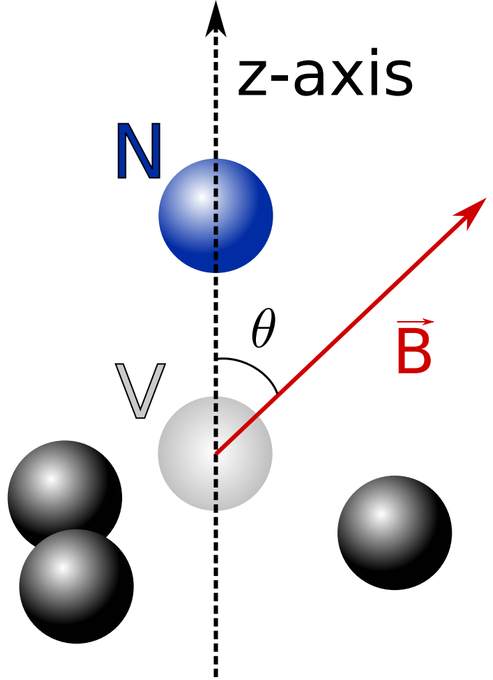
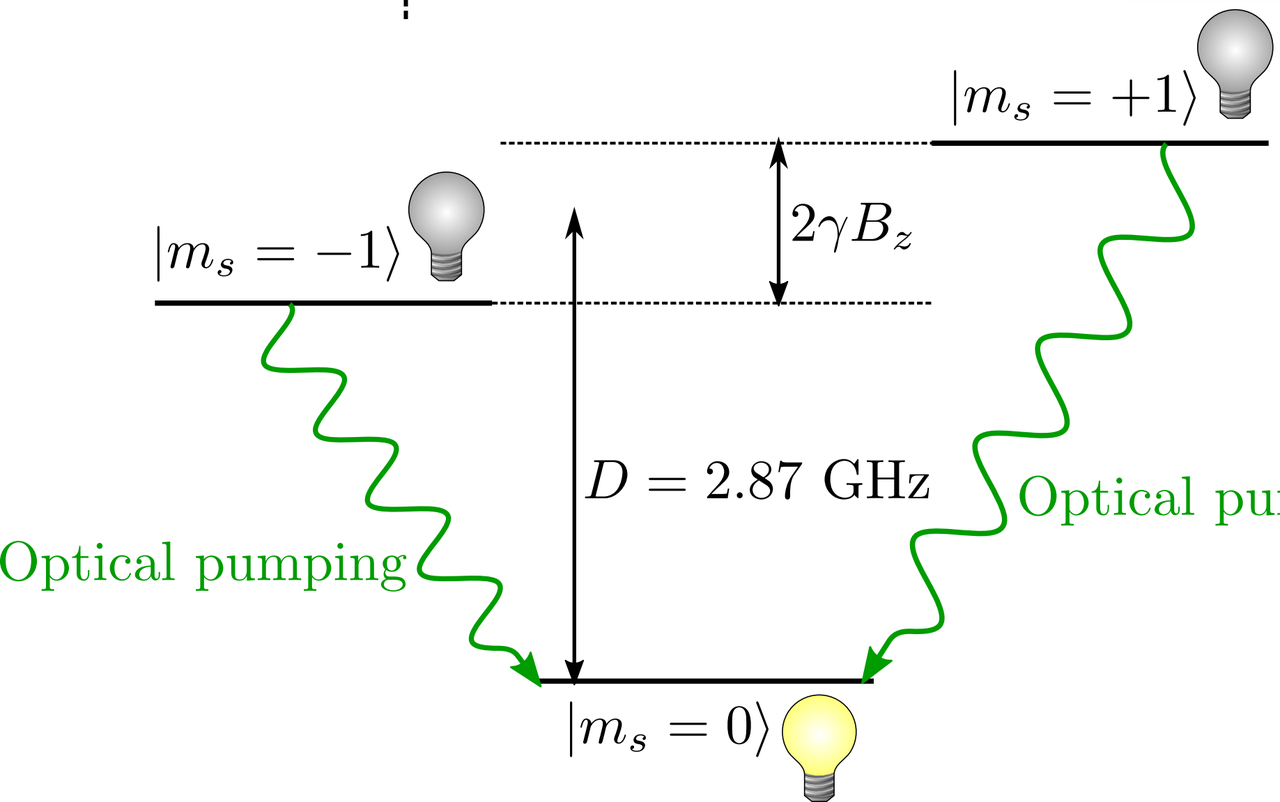


Ground level spin Hamiltonian

$$\hat{\mathcal{H}}_s = DS_z^2 + \gamma_e \mathbf{B} \cdot \hat{\mathbf{S}}$$

$$D = 2.87\,\mathrm{GHz} \text{ and } \gamma_e = 2.8\,\mathrm{MHz/G}$$

$$\mathcal{H}_s = \begin{pmatrix} D - \gamma_e B\cos\theta & \gamma_e B\sin\theta & 0 \\ \gamma_e B\sin\theta & 0 & \gamma_e B\sin\theta \\ 0 & \gamma_e B\sin\theta & D + \gamma_e B\cos\theta \end{pmatrix}$$



- $|0\rangle$ state brighter than $|\pm 1\rangle$ state by ~ 30 %
- polarization in $|0\rangle$ state of ~ 80 %
  (equivalent to ~ 65 μK)

- Longitudinal lifetime $T_1 \sim 5$ ms (phonons)
- Dephasing time $T_2^* \sim 1$ μs (magnetic noises)