

GoldCoreX Simulation Addendum

Photon-Induced Qubit Flipping in Isolated Gold Atoms

1. Photon Energy Calculation

Photon Energy Calculation:

A 520 nm green photon was selected to model interaction with an isolated Au-197 atom.

- Planck's constant (h): 6.626×10^{-34} J·s
- Speed of light (c): 3.00×10^8 m/s
- Wavelength (λ): 520 nm = 520×10^{-9} m

Resulting energy:

- Energy = $hc / \lambda = 3.82 \times 10^{-19}$ J = 2.39 eV

This matches transition bands observed in gold atoms, especially in confined states such as diamond-embedded environments.

2. Rabi Oscillation Result

Qubit Flip Modeling via Rabi Oscillation:

We assume a resonant interaction between the photon and the atom with a strong coupling ($\Omega = 1$ THz).

Using Rabi's formula: $P(t) = \sin^2(\Omega t/2)$, we plotted qubit flip probability over a 5 ps interval.

Results indicate:

- Coherent oscillations between $|0\rangle$ and $|1\rangle$ states
- Periodic full-state transitions, reaching ~100% flip probability at regular intervals

This suggests that under tuned photonic input, quantum state control is achievable in gold qubits embedded

in diamond.

