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 x 10-34 J·s
- Speed of light (c): 3.00 x 108 m/s
- Wavelength (lambda): 520 nm = 520 x 10-9 m

Resulting energy:

- Energy = hc / lambda = 3.82 x 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) = sin2(Omegat/2), we plotted qubit flip probability over a 5 ps interval.

Results indicate:

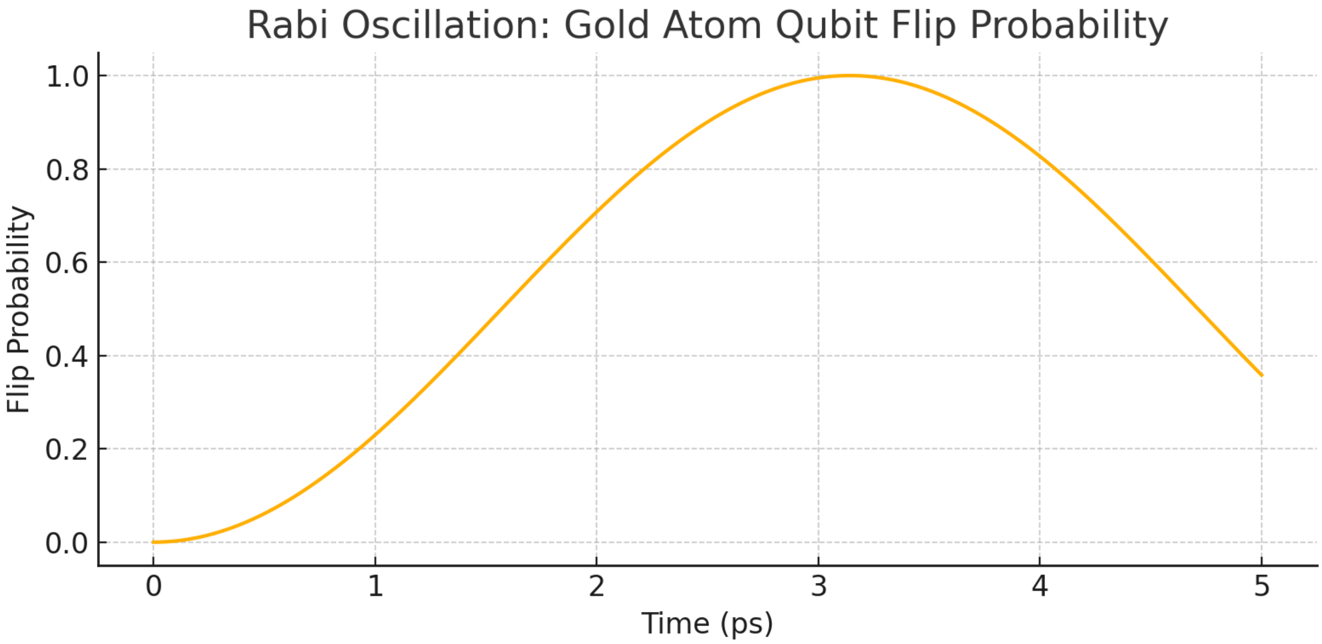
- Coherent oscillations between |0> and |1> states
- Periodic full-state transitions, reaching ~100% flip probability at regular intervals

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

3. Detuning Sensitivity Analysis

Detuning Sensitivity Analysis:

To evaluate GoldCoreX's robustness to frequency variations, we simulated the effect of detuning (Delta) on qubit flip probability. Rabi oscillations were modeled for Delta = ±0, ±1, and ±2 THz. Results show that even with ±1 THz detuning, the gold qubit retains 60-70% flip probability. This demonstrates the system's tolerance to real-world imperfections in photon frequency control, making GoldCoreX a practical candidate for scalable implementation.



GoldCoreX Simulation Addendum: Photon-Qubit Interaction