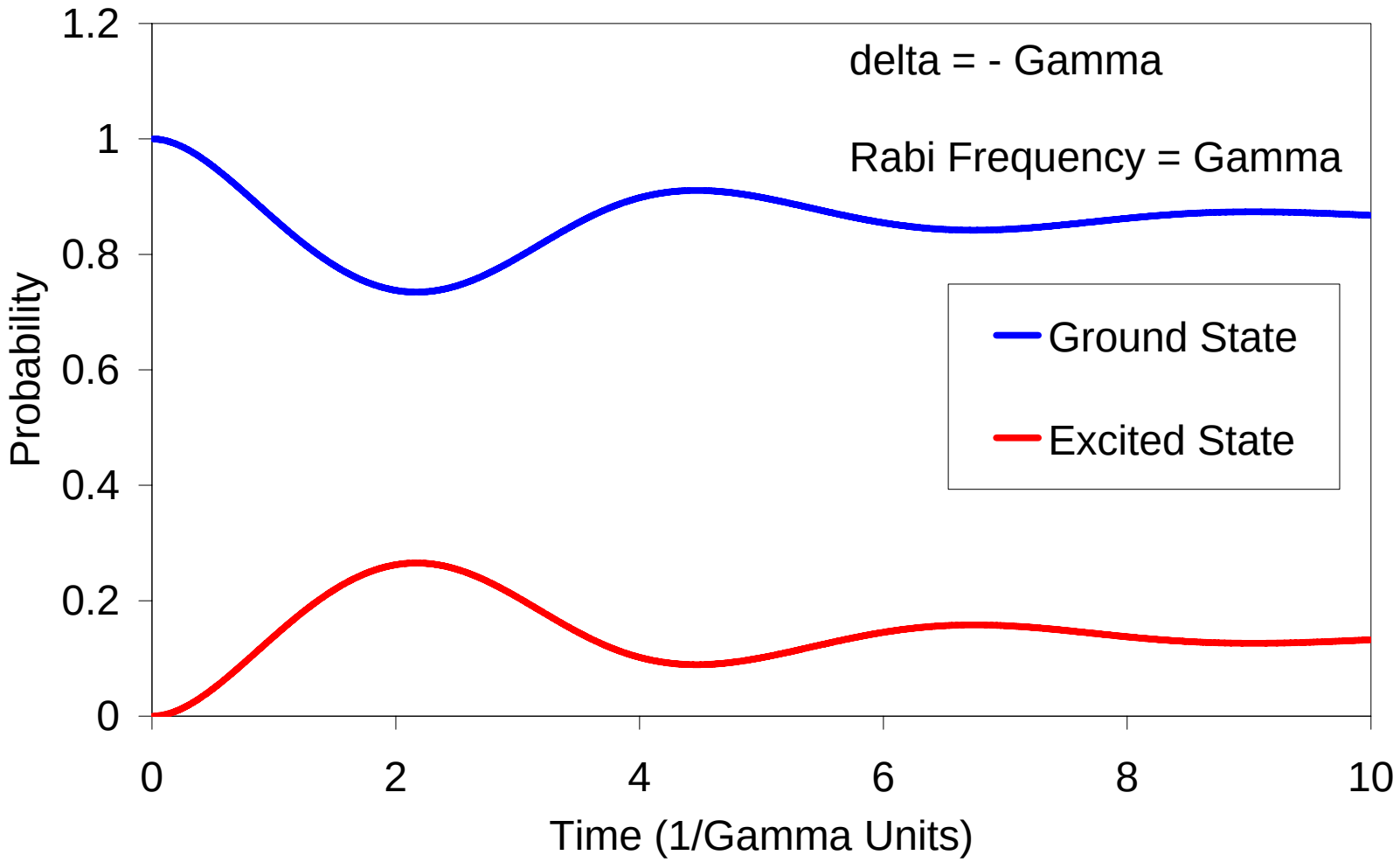
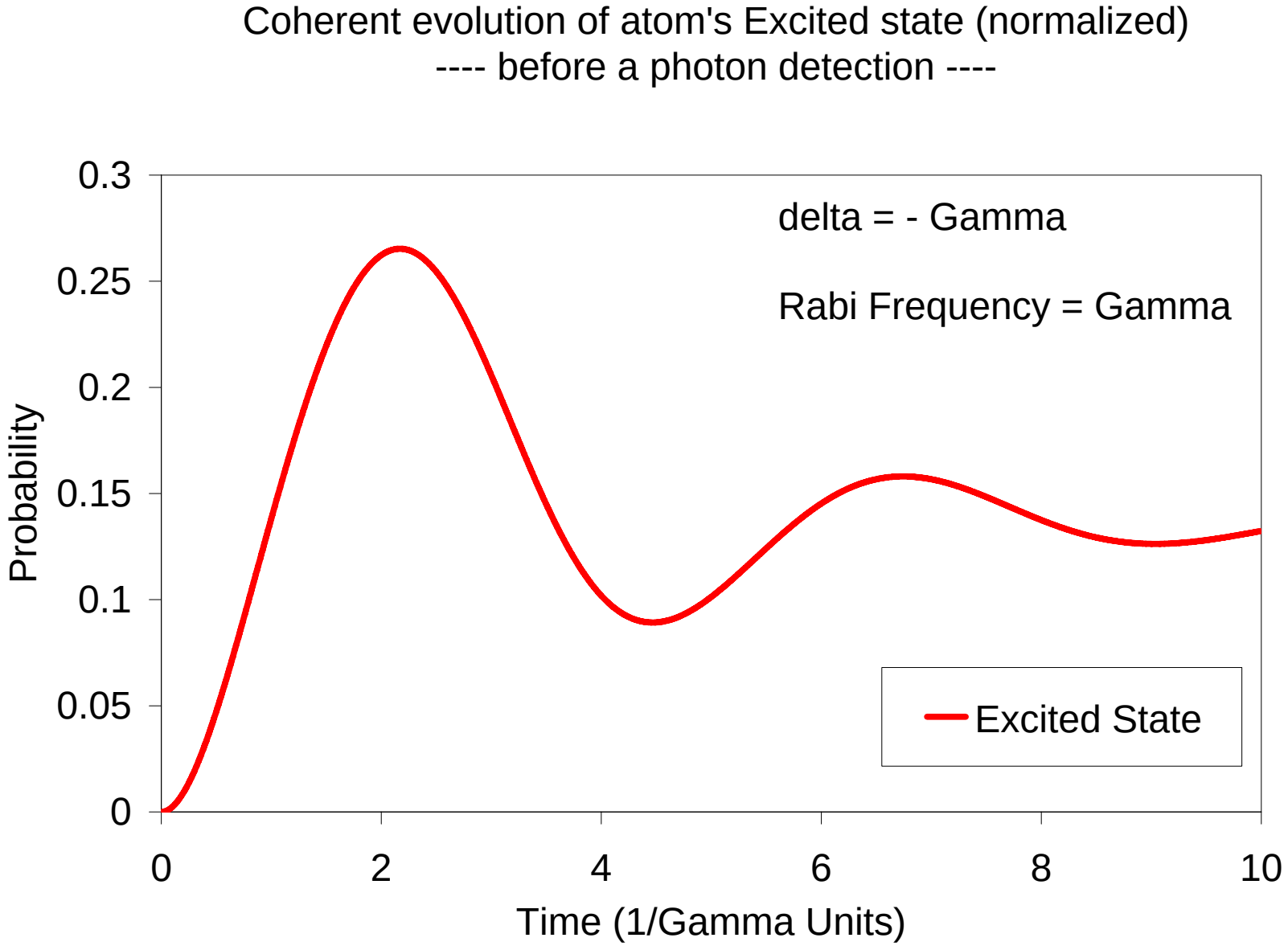
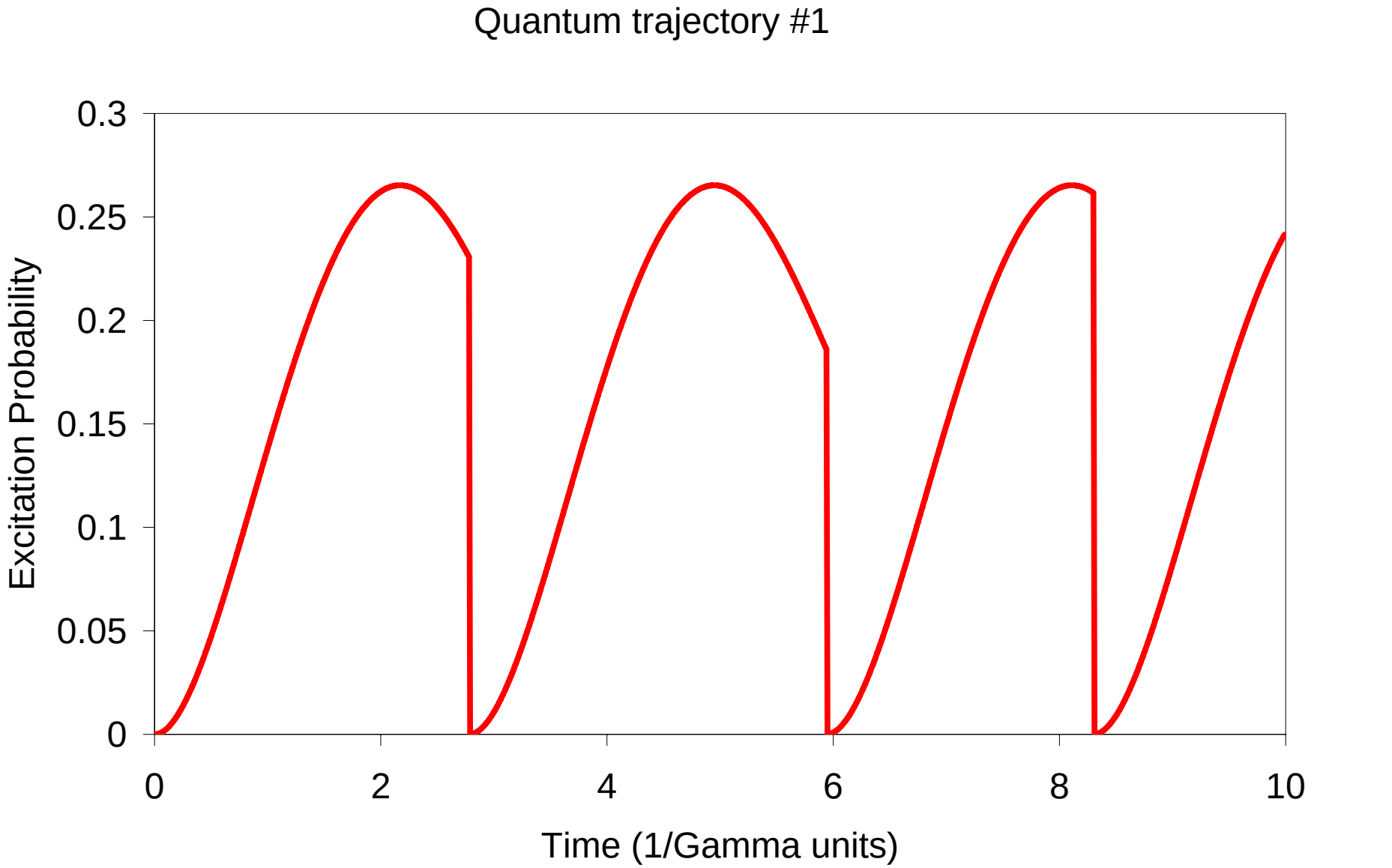
Coherent evolution of atom (normalized)
---- before a photon detection ----

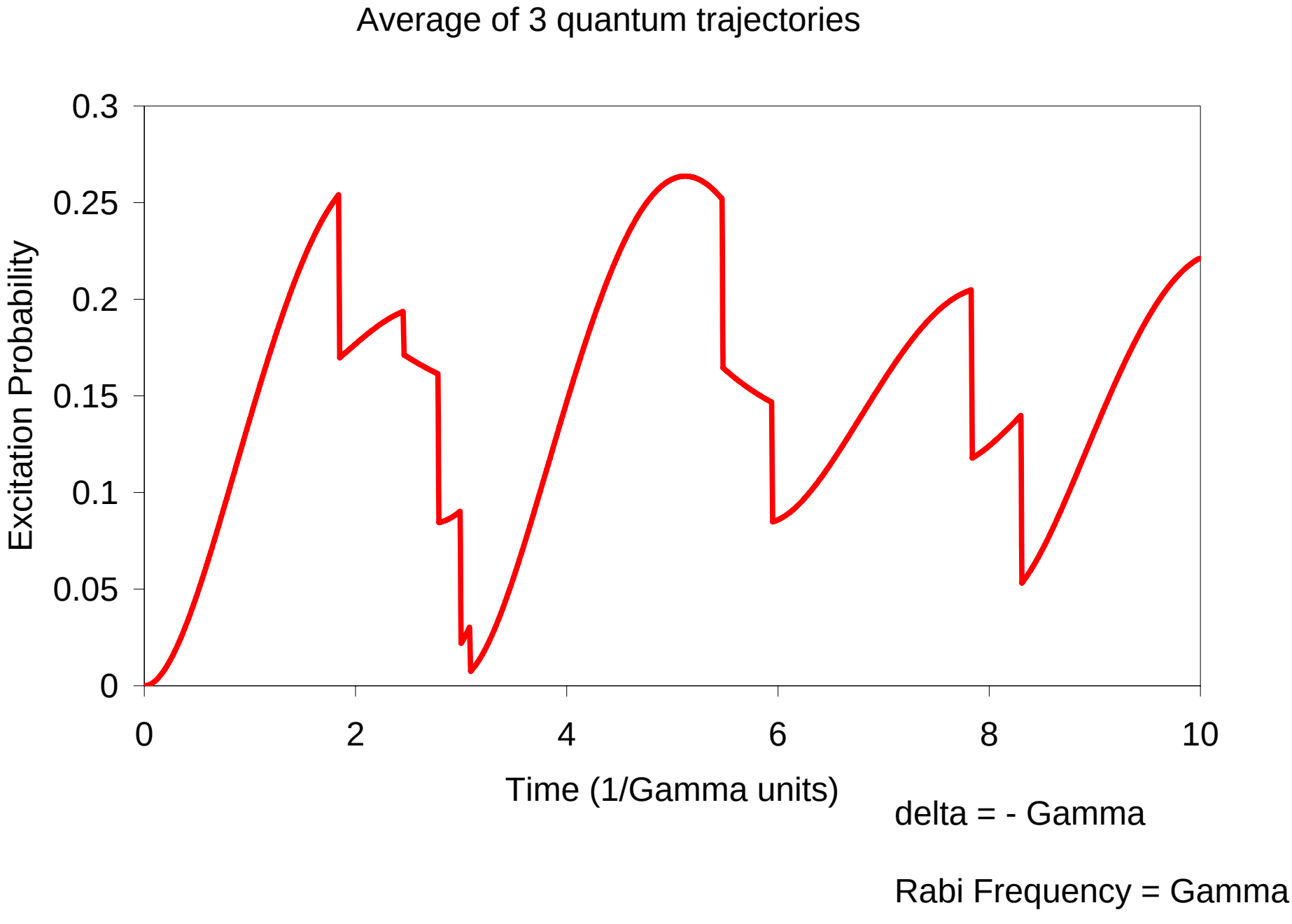


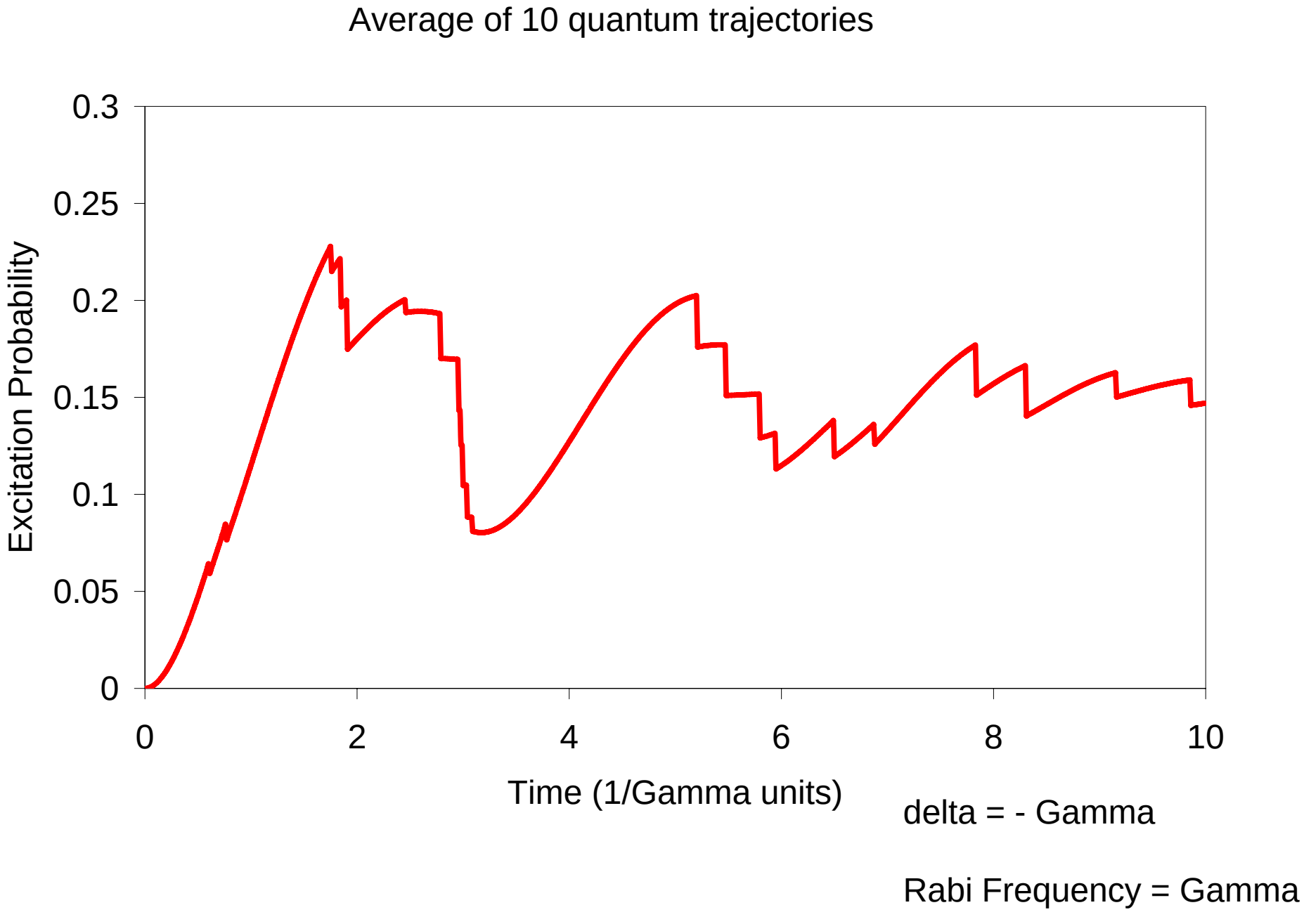

Coherent evolution of atom's Excited state (normalized)
---- before a photon detection ----
delta = - Gamma
Rabi Frequency = Gamma
Excited State
Probability
Time (1/Gamma Units)
0.3
0.25
0.2
0.15
0.1
0.05
0
0
2
4
6
8
10

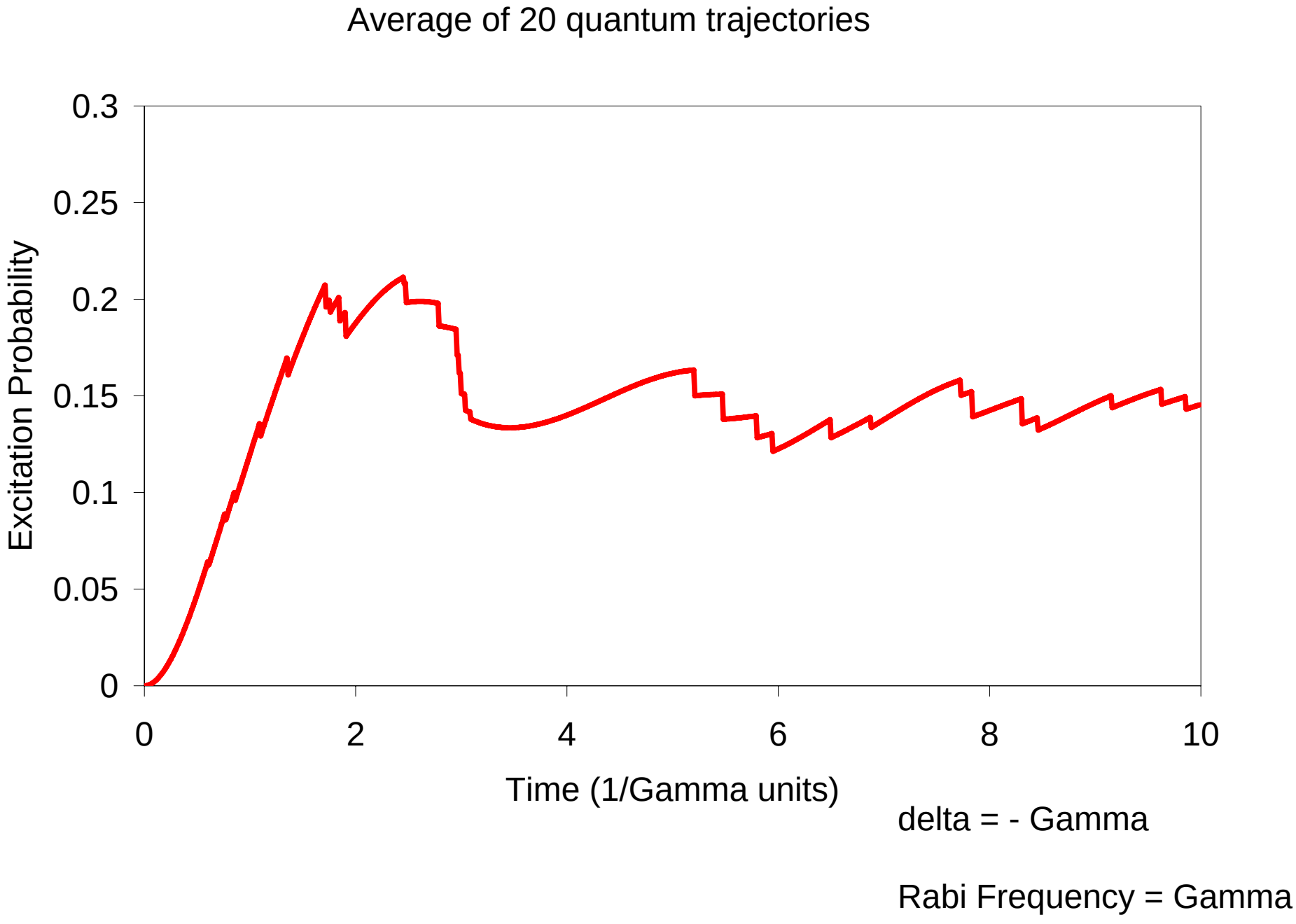


delta = - Gamma

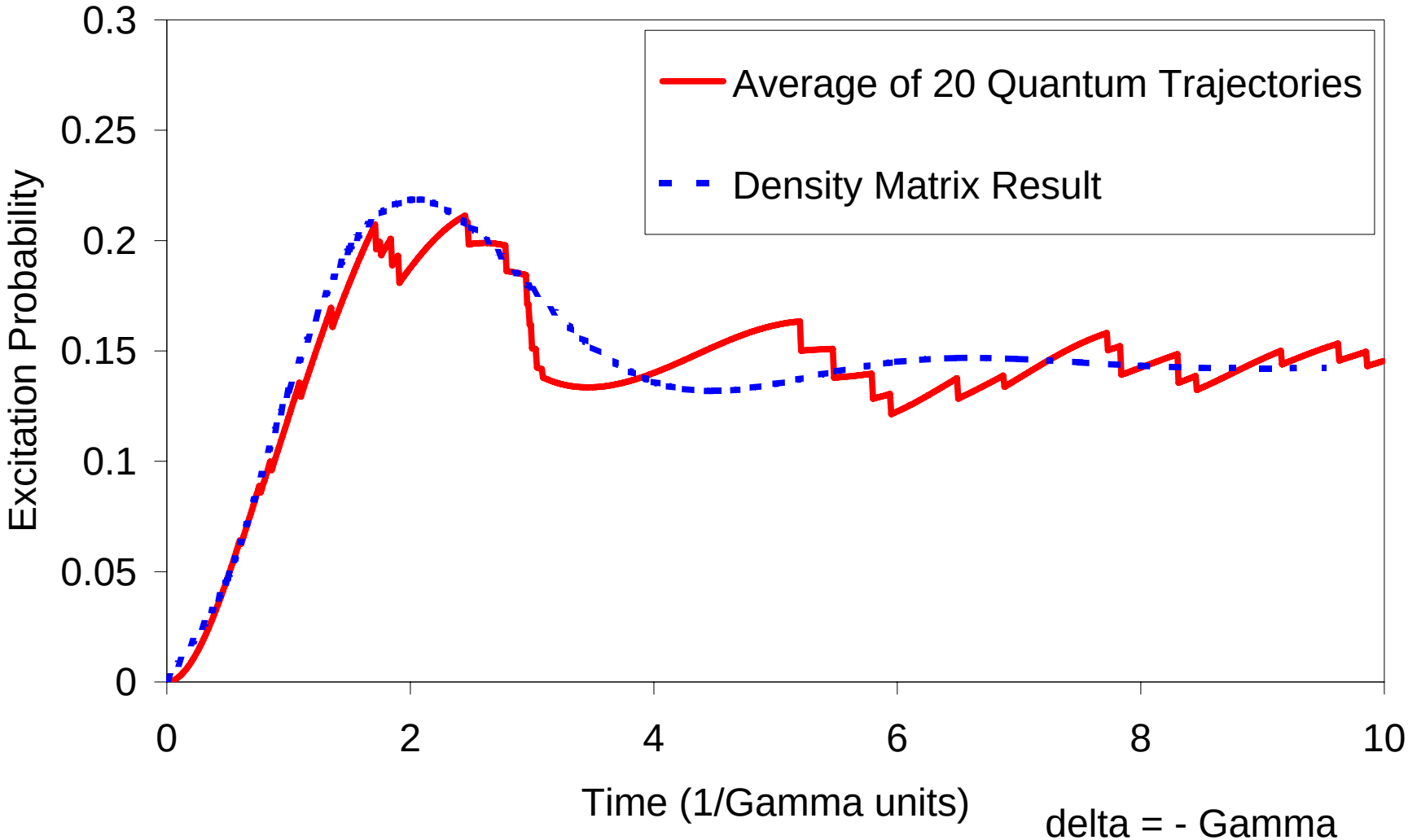
Rabi Frequency = Gamma


Average of 3 quantum trajectories
Excitation Probability
0.3
0.25
0.2
0.15
0.1
0.05
0
0
2
4
6
8
10
Time (1/Gamma units)
delta = - Gamma
Rabi Frequency = Gamma


Average of 10 quantum trajectories
Excitation Probability
0.3
0.25
0.2
0.15
0.1
0.05
0
0
2
4
6
8
10
Time (1/Gamma units)
delta = - Gamma
Rabi Frequency = Gamma


Average of 20 quantum trajectories
Excitation Probability
0.3
0.25
0.2
0.15
0.1
0.05
0
0
2
4
6
8
10
Time (1/Gamma units)
delta = - Gamma
Rabi Frequency = Gamma

Quantum Trajectories method converges to Density Matrix result



delta = - Gamma

Rabi Frequency = Gamma

Quantum Trajectories
vs.
Density Matrix

Quantum Trajectories

- Follows what happens experimentally (more **intuitive**).
- **Individual trajectories** can provide insight into the physical processes that lead to the Density Matrix result.
- N equations & N unknowns

  → **computationally efficient** for large N.
- **Numerical method**, but can generate analytic results.

Density Matrix

- **Simple recipe**.
- Can provide **analytic solutions**.

  → though generally solved numerically.
- It's a **black box**

  → sometimes hard to distill the fundamental physical processes from results.
- Only produces **ensemble-averages**.