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Project idea: Solve the Lindblad equation numerically for different states (single spin ½, entangled state, coherent/thermal light state etc.) and visualise it.

Why is this useful: You can study the interaction of a quantum state with its environment and study for example spin relaxation and dephasing (useful in quantum computing, NMR etc).

Aim (deliverables): Relaxation times, animations of system evolution

Goals/milestones:
Week 1: Implement solving of the equation, prove it works for a simple NMR case (validate the code).
Week 2: Validate the code for the simplest scenario (single spin) and find T1 and T2 decay times, produce plots and/or animations.
Week 3: Produce plots and animations for more elaborate scenarios (eg. entangled states, superposition, coherent/thermal light etc).

Links/reference to literature:
Bachelor course TN3155 (Lecture 8)
Chapter 8 (3?) of Introduction to Quantum Optics by Cristopher C. Gerry and Peter L. Knight