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Quantum Control Methodology for Creation of GHZ and W states of Rydberg atoms[1] ELLIOT PACHNIAK, SVETLANA MALINOVSKAYA, Stevens Institute of Technology, Department of Physics — Rydberg atoms with very high principal quantum number trapped in a optical trap are used to study the collective spin properties of ultracold atomic systems. The interaction Hamiltonian of the collective spin states were explored in the blockade regime for diatomic and triatomic chains. The diagonal of the Hamiltonian is taken to find all locations where energy level states are in resonance. Control parameters including two-photon detuning δ, Rabi interaction $\vee$, and chirp rates α, β can be manipulated to get resonance between ground and excited energy levels and suppress all other interactions. Rydberg atoms have two well defined entangled states known as the Greenberger-Horne-Zeilinger (GHZ) state and the W state. By suppressing unwanted interactions both entangled states can be found by choosing $\vee$ and Ω and then sweeping over values of one-photon detuning Δ.

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