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Quantum control of ultracold Rb[1] SVETLANA MALINOVSKAYA, THOMAS COLLINS, SPENCER HORTON, Stevens Institute of Technology — Ultracold control has originated on the base of latest developments in the field of ultracold gases. Control of electron dynamics within the hyperfine structure in the ultracold Rb atom using chirped pulses aimed to induce the desired excitations and create predetermined non-equilibrium states will be discussed. We show population inversion within the hyperfine levels of $5^2S_{1/2}$ state through Raman transitions by making use of a single ns chirped pulse having kW/cm^2 beam intensity. Satisfying the one-photon resonance condition with a hyperfine state of the $5^2P_{1/2}$ or $5^2P_{3/2}$ state allows us to enter the adiabatic region at field intensities such that the corresponding Rabi frequencies are less than or equal to the hyperfine splitting. We will highlight the studies of the impact of decoherence through the process of cooling of internal degrees of freedom in KRb from the Feshbach state by implementation of optical frequency combs in a framework of a semiclassical model.

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