in the KRb Feshbach molecule. Thus, the parameters of the phase stabilized pulse train, needed to accomplish rovibrational cooling from Feshbach states, have to be chosen based on the analysis of the power spectrum of the sin-phase modulated optical frequency comb and the energy levels involved into dynamics of the molecular system.

Lowering the value of the Rabi frequency, which corresponds to decrease in the field intensity, gives qualitatively similar results of coherent, adiabatic accumulation of population in the final, ultracold state leading to full population transfer. The difference is in the time scale of the dynamics which becomes an order of magnitude longer, as calculations show, however, is well within the lifetime of the Feshbach molecules. Elongation of duration of population dynamics is observed also with the decrease in the pulse repetition rate. Due to computational limitations on the propagation time, we use the values of the parameters of the Rabi frequency and pulse train repetition rate that demonstrate the phenomenon on a shorter time scale. Close to experimental values parameters of the field intensity and the repetition rate are implemented to the standard optical frequency comb interaction with the three-level λ-system, described next.

We investigated the interaction of a single, standard optical frequency comb with the three-level λ-system. The standard femtosecond optical frequency comb is formed by a phase-stabilized pulse train without phase or amplitude modulation across an individual pulse. The carrier-envelope phase is made to be zero. The pulse train reads

$$E(t) = \Sigma_{k=0}^{N-1} E_0 \exp(-(t-kT)^2/(2\tau^2)) \cos(\omega_L(t-kT))). \tag{3}$$

Here, T is the pulse train period, τ is the pulse duration, ω_L is the carrier frequency. The carrier frequency of the pulse train ω_L is chosen to be in resonance with the one-photon transition frequency ω_{32} in the λ-system. The two-photon resonances in the λ-system are provided by the pairs of optical frequencies present within the frequency comb that are multiples of the radio frequency and satisfy the two-photon resonance condition $mf_r - nf_r = \omega_L - n' f_r = \omega_{31}$, here m, n, n' are integer numbers. Calculations were performed for two values of the peak Rabi frequency: $\Omega_R = 0.1\omega_{31}$ and $\Omega_R = 0.01\omega_{31}$, they determine the electric field intensity in the range from 10^{14} to 10^{12} W/cm^2. A single pulse area is estimated to be 0.03π to 0.003π respectively. Two values of the pulse train period were considered: $T = 6.4 \cdot 10^4 \tau$=0.2 ns, (5 GHz), and $T = 6.4 \cdot 10^5 \tau$=2 ns, (500 MHz), here the pulse duration τ is 3 fs.