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The application of coherent anti-Stokes Raman spectroscopy technique in remote molecular detection¹ GENGYUAN LIU, Stevens Institute of Technology, FRANK NARDUCCI, Naval Postgraduate School, SVETLANA MALINOVSKAYA, Stevens Institute of Technology — The demand for remote molecular detection has been rising in recent years. The technique of coherent anti-Stokes Raman spectroscopy (CARS) is becoming one of the most optimal solutions due to its high efficiency, fast response time and ease of use. In this work, we present a new method of open air molecular detection technique by using CARS. A semiclassical theory of nonlinear scattering is introduced to estimate the number of detectable photons in a CARS signal from the target molecule clusters in the background of open air. Several key parameters are studied to provide an optimal solution. Here the novelty in implementing CARS technique is in using optical frequency combs to estimate the sustainable CARS signal. In addition, the accumulating propagation of the signal is obtained by solving the Maxwell-Liouville-von Neumann equations numerically.

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