**Monte Carlo Studies of Nonlinear Optical Susceptibilities of Classes of Physical Potentials**[1] SHORESH SHAFEI, MARK G. KUZYK, Washington State University — The fundamental limit of the first- and second-order hyperpolarizabilities in the off-resonant regime, $\beta$ and $\gamma$ respectively, have been calculated using three level ansatz, which states that when $\beta$ and $\gamma$ are at the limit, only two excited states contribute. However, experimental results reveal a factor-of-thirty gap between experimentally measured values of the hyperpolarizability and the fundamental limit. We apply the Monte Carlo method to study the nature and characteristics of various energy level spacing that corresponds to classes of potentials to investigate why the hyperpolarizabilities are far below the limit. We also use the Monte Carlo simulations to address the gap between experimental values and the analytical results to verify numerically if the three level ansatz is valid.

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