

Static Exchange in the High-harmonic Generation of N₂

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Effects of static exchange (S.E.) in the high-harmonic generation (HHG) of N₂ are investigated by modifying the Lewenstein model¹ based on strong field approximation. A new model is established through adding S.E. to transition dipole moment. The spectral calculated by the new model exhibits no changes in the overall structure but the intensity is found enhanced compared with the original obtained from the SLIMP package². We examine the yields of harmonics integrated from the 19-th to 23-rd harmonics versus alignment angle θ between the molecular main axis and the laser-field polarization direction. We find that the difference between the models is largest at $\theta=0^\circ$ indicating that the static exchange between the HOMO ($3\sigma_g$) and HOMO-2 ($2\sigma_u$) modifies the spectra at 0 degree alignment. On the other hand, the difference is vanishing at alignment of 90° because of the symmetry of the recombination dipole moment into the HOMO-2 orbital. Time-dependent HF calculation is performed to justify the new model as well.

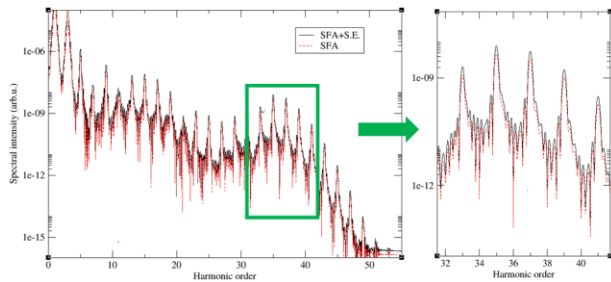


Figure 1. The harmonic spectra of N₂ for $\theta=0^\circ$, which

is obtained from SFA with S.E. (solid line) and SFA without S.E. (dashed line). The laser intensity and wavelength are 2×10^{14} W/cm² and 800 nm, respectively.

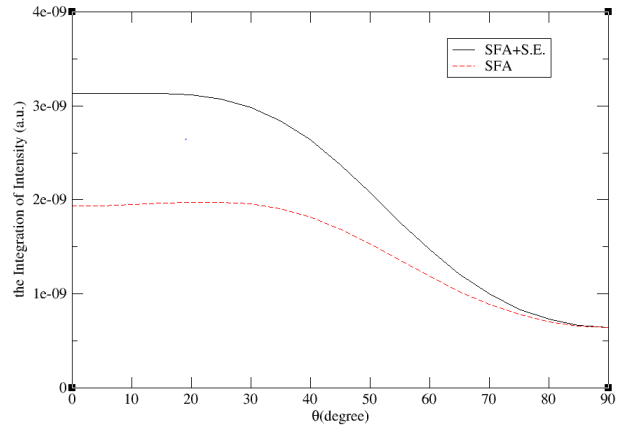


Figure 2. The yields of harmonics integrated from the 19-th to 23-rd harmonics versus alignment angle θ .

References

- [1] Lewenstein M et al., Phys. Rev. A 49:2117(1994)
- [2] Bin Zhang et al., Comp. Phys. Comm. 192, 330(2015)

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