Low-energy resonant electron collisions with CO

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In our contribution we present results of model calculations of nuclear dynamics of resonant collisions of electrons with the molecule CO at low energies, particularly we are interested in the process of vibrational excitation by electron impact via a $^2\pi$ shape resonance.

Recently, a numerically exactly solvable simple model for electron-molecule collisions with one nuclear and one electronic degree of freedom has been introduced [1]. In a subsequent study [2] it has been shown that cross sections calculated within the nonlocal approximation to the nuclear dynamics for N2, F2 and NO-like models agree very well with results of exact 2D model calculations. In our work we constructed a similar CO-like model for which it is possible to compare the exact cross sections with results of nonlocal approximation and other methods.

Furthermore, we constructed a nonlocal resonance model [3] for this system by fitting model parameters to the potential energy curves and eigenphase sums obtained from the ab initio fixed-nuclei electron scattering calculations using the Schwinger multichannel method [4,5] and calculated the cross sections of vibrational excitation of CO. We used the two dimensional model mentioned above to clarify which approach for fitting eigenphase sums is best suited for the CO molecule. Results are compared with the recent measurements of Allan [6] and the results of the R-matrix calculations by Morgan [7].

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