

Quantum control of non-adiabatic photodissociation : application to CO²⁺

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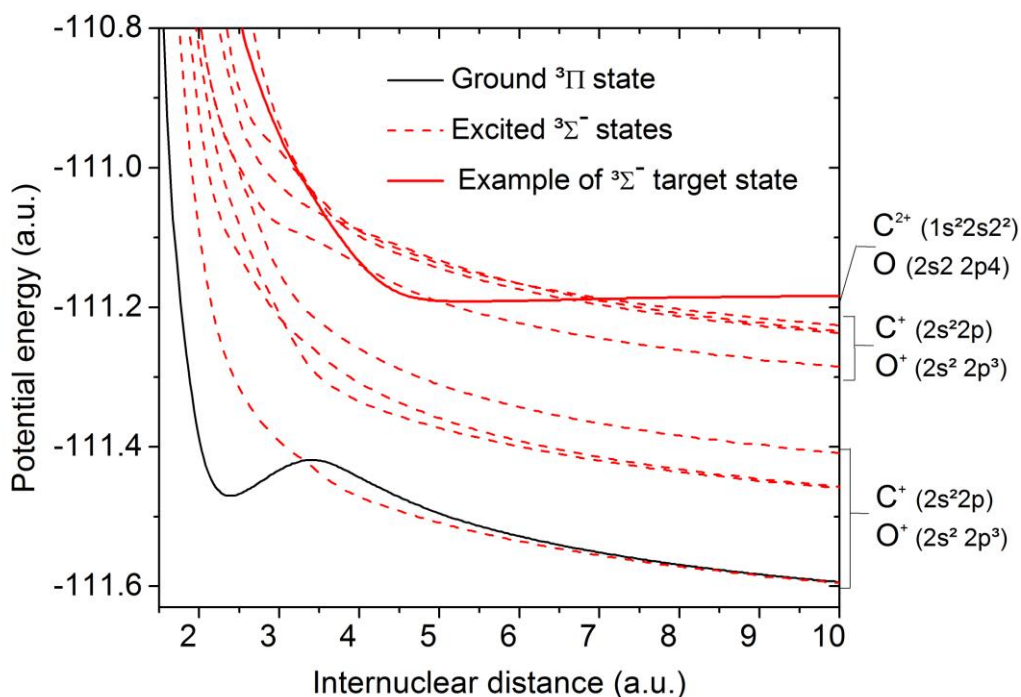
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The dication CO²⁺ is thought to be a good candidate for quantum control experiments as it can be experimentally obtained in the lowest vibrational level of its ground state almost exclusively [1]. Due to the peculiar shape of its potential energy curve, its excited vibrational levels indeed predissociate in less than a microsecond whereas the $v=0$ level has a lifetime of tens of milliseconds at least [2].

The photodissociation dynamics of CO²⁺ is however far from trivial as the excited, dissociative channels are strongly non-adiabatically coupled. We theoretically compute laser pulses that enhance the photodissociation of the molecule into C²⁺ + O instead of C⁺ + O⁺ through the ³Σ⁻ channels. Two approaches are compared: Optimal Control Theory and a local control strategy based on Møller operators [3].



Diabatic potential energy curves of the ³Π ground state of CO²⁺ (black) and of its first ³Σ⁻ excited states (red).

References:

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