

Control of photodissociation pathways through Zero-Width Resonances

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Abstract

We have been exploring the possibility to base a control of molecular photodissociation on the existence of zero-width resonances for critical field intensities. The figure shows the behaviour of the photodissociation rate as a function of time for several Floquet states of H_2^+ labelled with the vibrational quantum numbers of the field-free states. An adiabatic assumption is made: the Floquet states are calculated with a cw field with the intensity of the pulse at time t . The decay rate of the resonance issued from $v = 8$ passes twice through a null value. For an initial molecular state consisting of a mixture of these states, after the end of the pulse the state $v = 8$ has the largest survival probability. Depending on the laser frequency different molecular Floquet states present this property of a zero width. This opens the possibility to populate selectively a given molecular state

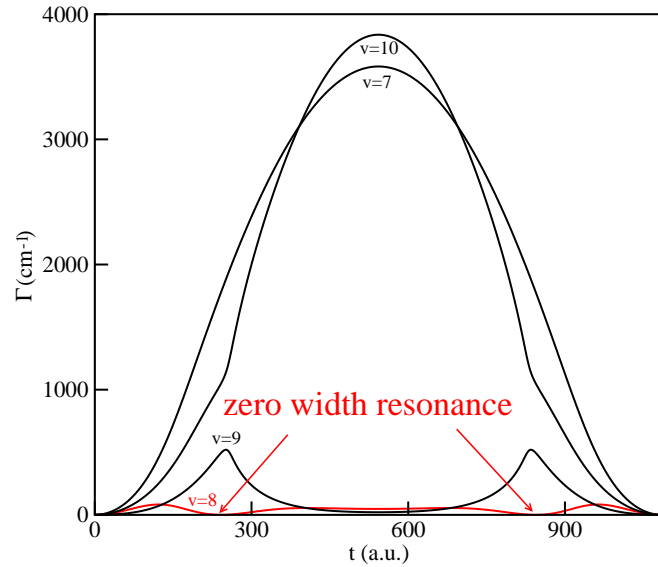


Figure 1: Variation with time of the rates of the Floquet states issued from various field-free vibrational states $v = 7$ to $v = 10$ of H_2^+ . The critical intensity for $v = 8$ is $0.5 \cdot 10^{13} \text{ W/cm}^2$. Wave length: 400 nm.

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