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Laser Controlled Rotational Cooling in Na_2 Based on Exceptional Points[1] ADAM WEARNE, VIATCHESLAV KOKOOULINE, University of Central Florida, OSMAN ATABEK, ROLAND LEFEBVRE, Laboratoire de Photophysique Moleculaire du CNRS, Universite Paris-Sud, Orsay, France, UCF-ISMO COLLABORATION — In this study, we describe a computational simulation of the interaction of diatomic molecule with an applied laser field. It is known that for certain laser wavelengths and intensities, the wave functions and eigenenergies of two states become degenerate. Such locations in the laser parameter space are known as "exceptional points." By applying a laser pulse which encircles one or more exceptional points in the parametric plane of wave length versus intensity, one can bring an ensemble of diatomic molecule into a pre-selected rovibrational state after the laser pulse is over. During this process, a fraction of the molecules dissociate, and those which remain, are brought to the chosen rovibrational state. Although this scheme can be applied more generally, here we use Na_2 as an illustrative example. We examine the locations in the parameteric space of exceptional points, which lead to the exchange of rotational states, and how the shape of laser pulse in the parametric plane affects the "purification" of the chosen rovibrational state and the dissociation of other states.

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Adam Wearne
University of Central Florida

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