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Characteristic footprints of an Exceptional Point in the Dynamics of Li Dimer Under a Laser Field IDAN HARITAN, Schulich Faculty of Chemistry and Russell-Berrie Nanotechnology Institute, Technion-Israel Institute of Technology, IDO GILARY, ZOHAR AMITAY, Schulich Faculty of Chemistry, Technion-Israel Institute of Technology, NIMROD MOISEYEV, Schulich Faculty of Chemistry, Russell-Berrie Nanotechnology Institute, and Department of Physics, Technion-Israel Institute of Technology — The coupling of electronic surfaces induced by laser fields can mix between ro-vibrational bound and continuum states. This mixing leads to a metastable state often called resonance, characterized by a finite lifetime. As shown here, for specific values of the laser frequency and intensity, two resonances can become degenerate. This type of degeneracy is very different in its nature from the bound states' degeneracy, and is known as an exceptional point (EP). An EP holds unique characteristics. One of which is a switch like behavior. Our numerical studies show that by varying adiabatically the laser parameters in a closed loop around the EP, one resonance of the Li dimer permutes with another resonance. Given all of the above, it is clear why finding footprints of this exceptional phenomenon is of the essence. For a Li dimer the cw laser field couples the X, A and E electronic surfaces of the molecule, and thus creating an EP. We show how one can probe the EP by varying the laser intensity in the specific frequency of the EP. Finally, as a conjecture based on this numerical study, we suggest that the footprints of this EP might be reflected in a simple measurement - by the amount of molecules that dissociate. The fraction of the dissociated molecules will abruptly reduce once the EP is reached.

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