QUANTUM CONTROLLED NUCLEAR FUSION

MARTIN GRUEBELE, *Department of Chemistry, University of Illinois at Urbana-Champaign, Urbana, IL, USA*.

Laser-assisted nuclear fusion is a potential means for providing short, well-controlled particle bursts in the lab, such as neutron or alpha particle pulses. I will discuss computational results of how coherent control by shaped, amplified 800 nm laser pulses can be used to enhance the nuclear fusion cross section of diatomic molecules such as BH or DT. Quantum dynamics simulations show that a strong laser pulse can simultaneously field-bind the diatomic molecule after electron ejection, and increase the amplitude of the vibrational wave function at small internuclear distances. When VUV shaped laser pulses become available, coherent laser control may also be extended to muonic molecules such as D-mu-T, held together by muons instead of electrons. Muonic fusion has been extensively investigated for many decades, but without coherent laser control it falls slightly short of the break-evne point.