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External Field Control of Molecular Dynamics ROMAN KREMS, CUA and ITAMP, Harvard-Smithsonian CfA, ALEXANDER DALGARNO, ITAMP and CUA, Harvard-Smithsonain CfA — Inelastic collisions of cold atoms and molecules and dissociation of cold molecules can be manipulated with external electric, magnetic and radiative fields. We show that external field control of molecular dynamics can be based on several principles. Zeeman and Stark effects may remove some of the energetically allowed dissociation paths or they may open closed dissociation channels, leading to suppression or enhancement of the dissociation efficiency. External fields couple the states of different total angular momenta, so that forbidden electronic transitions may become allowed in an external field and the transition rate may be controlled by the field strength. We discuss the range of magnetic fields for magnetic field control of molecular dynamics and outline the prospects for external field control of chemical reactions in binary collisions of cold molecules.

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