Manoeuvring chemical reactions one degree of freedom at a time

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The combined use of electric fields, magnetic fields and laser light affords us an ever-increasing level of control over the properties of atoms and molecules, enabling reactivity to be probed as a function of their various degrees of freedom. Here, we discuss how electrostatic deflection can be employed to disentangle the reactivity of molecules in different rotational states, or with different spatial orientation of their constituent atoms. Furthermore, we demonstrate for the first time the sympathetic cooling of different conformational isomers within a Coulomb crystal, setting the scene for fully conformationally selected ion–molecule reaction studies.

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