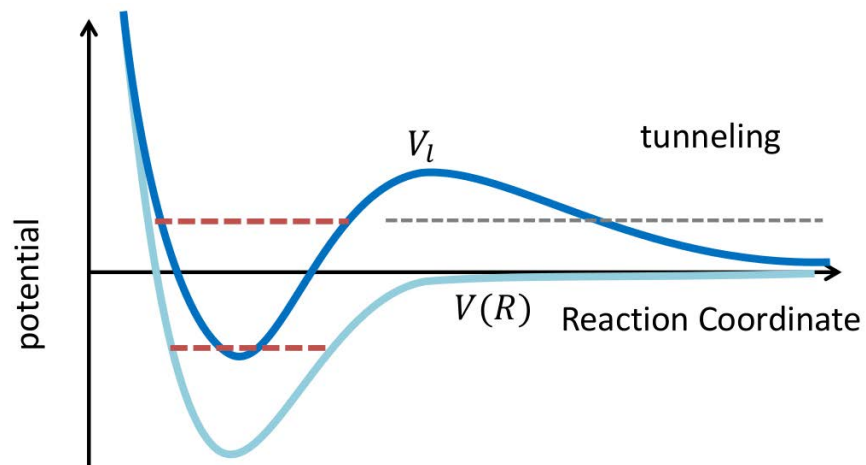


Quantum resonances in cold collisions

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Collisions between individual atoms and molecules in the gas phase provide the most basic testbed for our understanding of intermolecular interactions. At low collisional energies, quantum effects such as tunneling and resonances dominate the scattering dynamics. Resonances correspond to a quantization of the relative motion; they enable the formation of chemical bonds and are particularly susceptible to external field control. Using the example of cold Penning ionization reactions, I will discuss under which conditions quantum resonances come into play in cold collisions, how they can be probed by external fields, and what they allow us to learn about the intermolecular interactions. Moreover, I will show how active control of scattering resonances modifies the process of bond making at very low temperature and thus provides a key to solution in the long-standing quest to control chemical reactions.