Low-energy collisions: adiabatic variational theory vs. experiment

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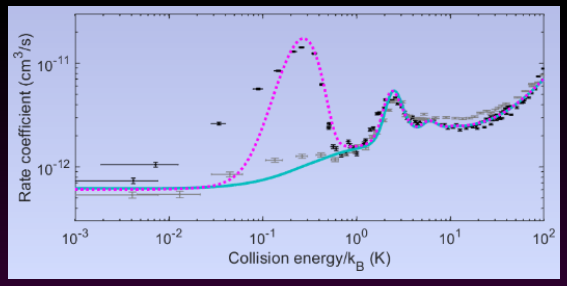
Goals

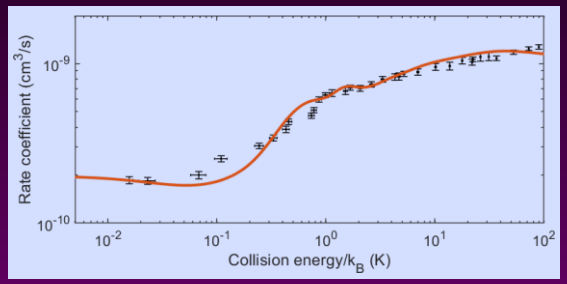
- Deriving a simple adiabatic theory for low-energy reactive collisions between atoms and molecules that is straightforward for implementing and sufficient to understand experimental data
- Applying techniques widely-used by chemical physicists
- Taking into account couplings between different angular momentum states and different angular momentum projection states
- Incorporating anisotropy in atom-molecule interactions
- Reducing the complexity of the problem without losing physical essence
- Improving the computational efficiency with respect to full quantum mechanical scattering calculations

Penning ionization rate coefficients

$$He(1s2s,^3S) + para/ortho\text{-}H_2 \rightarrow He(1s^2) + para/ortho\text{-}H_2^+ + e^-$$



$$He(1s2p,^3P) + para\text{-}H_2 \rightarrow He(1s^2) + para\text{-}H_2^+ + e^-$$



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