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Probing ultracold reaction with ion spectrometry[1]

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Advances in AMO techniques enabled the creation of ultracold samples of molecular species and opened opportunities to explore chemistry in the ultralow temperature regime. We report progress toward a detailed microscopic picture of molecules transforming from one species to another. So far, most studies of ultracold collisions rely on a loss-of-molecules signal. To extend such studies into the short-range where chemistry takes place, we combine the production of quantum-state-selected ultracold KRb molecules with ion mass and kinetic energy spectrometry, and directly observed KRb + KRb reaction intermediates and products. Such direct detections allow further studies, including measuring the transient reaction intermediate lifetime, steering the reaction pathway with light, and investigating the product state distribution.

[1]DOE YIP, the David and Lucile Packard Foundation, CUA-NSF