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Creation of ultracold triatomic molecules

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Ultracold assembly of diatomic molecules has enabled great advances in controlled chemistry, ultracold chemical physics, and quantum simulation with molecules. Extending the ultracold association to triatomic molecules will offer many new research opportunities and challenges in these fields. A possible approach is to form triatomic molecules in a mixture of ultracold atoms and diatomic molecules by employing a Feshbach resonance between them. Although ultracold atom-diatom-molecule Feshbach resonances have been observed recently, utilizing these resonances to form triatomic molecules remains challenging. I will talk about our recent work on the creation of ultracold triatomic molecules near the Feshbach resonance between ^{23}Na - ^{40}K molecules in the rovibrational ground state and ^{40}K atoms. We use both radio-frequency association and magnetoassociation to form triatomic molecules. Our work contributes to the understanding of the complex ultracold atom-molecule Feshbach resonances and may open up an avenue towards the preparation and control of ultracold triatomic molecules.

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