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Quantum Engineering of a Low-Entropy Gas of Heteronuclear Bosonic Molecules in an Optical Lattice ANDREAS SCHINDEWOLF, LUKAS REICHSÖLLNER, HANNS-CHRISTOPH NÄGERL, Institut für Experimentalphysik, Universität Innsbruck, Austria, TETSU TAKEKOSHI, RUDOLF GRIMM, Institut für Experimentalphysik, Universität Innsbruck, Austria; Institut fr Quantenoptik, und Quanteninformation IQOQI, Innsbruck, Austria — We present a novel method to prepare low-entropy samples of heteronuclear molecules confined to an optical lattice as an ideal starting point for dipolar quantum gas experiments based on ultracold molecules.[1] Starting from two spatially separated BECs we efficiently form Rb-Cs atom pairs by overlapping a Cs Mott insulator with a superfluid Rb sample in an optical lattice. For sample mixing the Rb-Cs interaction is nulled at a Feshbach resonance's zero crossing. Subsequently the Rb atoms are localized by increasing the lattice depth. The paired atoms are then associated to Feshbach molecules. With this method we obtain low-entropy molecular samples with a filling fraction exceeding 30%. Our method can now be combined with stimulated ground-state transfer (STIRAP) to produce dense and low-entropy samples of dipolar ground-state molecules as demonstrated on our previous work.[2] Our preparation procedure compares favorably with recent results from the JILA group on fermionic KRb molecules.[3]

[1]arXiv:1607.06536
[2]Phys. Rev. Lett. 113, 205301 (2014)
[3]Science 350 , 659 (2015)

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