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### **Ultracold polar molecules<sup>1</sup>**

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Polar molecules - molecules exhibiting a permanent electric dipole moment - have bright perspectives as systems with long-range and anisotropic interaction. These interactions have been the basis for numerous exciting theoretical proposals ranging from ultra-cold chemistry, precision measurements, quantum phase transitions to novel systems for quantum information processing and quantum control with external magnetic and electric fields. We will present our recent work on the creation of a near quantum degenerate gas of rovibrational ground state polar  $^{40}\text{K}^{87}\text{Rb}$  molecules. Using a single step of two photon coherent transfer, we transfer weakly bound KRb molecules to the rovibrational ground state of the singlet electronic ground molecular potential. The polar molecules have a permanent electric dipole moment, which we measure with Stark spectroscopy to be 0.566(17) Debye.

<sup>1</sup>Work done in collaboration with K.-K. Ni, M. H. G. de Miranda, A. Pe'er, B. Neyenhuis, J. J. Zirbel, D. Wang, S. Kotochigova, P. S. Julienne, D. S. Jin, and J. Ye