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Creation of a strongly dipolar gas of ultracold ground-state ^{23}Na^{87}Rb molecules[1] MINGYANG GUO, BING ZHU, BO LU, XIN YE, FUDONG WANG, DAJUN WANG, Department of Physics, the Chinese University of Hong Kong, Hong Kong SAR, China, ROMAIN VEXIAU, NADIA BOULOUFA-MAAFA, GOULVEN QUÉMÉNER, OLIVIER DULIEU, Laboratoire Aimé Cotton, CNRS, Unversité Paris-Sud, ENS Cachan, Université Paris-Saclay, 91405 Orsay Cedex, France — We report on successful creation of an ultracold sample of ground-state ^{23}Na^{87}Rb molecules with a large effective electric dipole moment. Through a carefully designed two-photon Raman process, we have successfully transferred the magneto-associated Feshbach molecules to the singlet ground state with high efficiency, obtaining up to 8000 ^{23}Na^{87}Rb molecules with peak number density over 10^{11} cm^{-3} in their absolute ground-state level. With an external electric field, we have induced an effective dipole moment over 1 Debye, making ^{23}Na^{87}Rb the most dipolar ultracold particle ever achieved. Contrary to the expectation, we observed a rather fast population loss even for ^{23}Na^{87}Rb in the absolute ground state with the bi-molecular exchange reaction energetically forbidden. The origin for the short lifetime and possible ways of mitigating it are currently under investigation. Our achievements pave the way toward investigation of ultracold bosonic molecules with strong dipolar interactions.

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