Abstract Submitted
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Suppression of anisotropic interactions between ultracold polar molecules[1] NADIA BOULOUFA-MAAFA, ROMAIN VEXIAU, MIREILLE AYMAR, MAXENCE LEPERS, OLIVIER DULIEU, Laboratoire Aime Cotton, CNRS, Univ. Paris-Sud, ENS Cachan, Orsay — Due to their large permanent electric dipole moment, heteronuclear bialkali molecules offer the possibility of an exceptional level of control of their quantum properties by external electric fields in the ultracold regime. To that end, a detailed modeling of the molecule-molecule long-range interactions and molecule-field interactions is requested [1]. We have computed the long-range interactions between two identical heteronuclear bialkali molecules in their ground state. In free space, their interaction is characterized by a huge van der Waals coefficient, larger by three orders of magnitude than the one for alkali atoms. In an external electric field this huge isotropic van der Waals interaction compete with the expected anisotropic dipole-dipole interaction. For critical values of the electric field magnitude and intermolecualr distances we predict the mutual orientation of the two molecules but with no preferential direction in the lab frame. The strongly correlated nature of the corresponding eigenstates opens new possibilities to study many-body quantum physics.

[1] M. Lepers, R. Vexiau, N. Bouloufa, O. Dulieu, and V. Kokoouline, Phys. Rev. A 83, 042707 (2011).

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