Abstract Submitted
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Observation of cold dipolar collisions between centrifuge decelerated molecules THOMAS GANTNER, Max Planck Institute of Quantum Optics, XING WU, Department of Physics, Yale University, New Haven, CT 06511, USA; Department of Physics, Harvard University, Cambridge, MA 02138, USA, MANUEL KOLLER, MARTIN ZEPPENFELD, Max Planck Institute of Quantum Optics, SOTIR CHERVENKOV, None, GERHARD REMPE, Max Planck Institute of Quantum Optics — Understanding molecular collisions at low energies is a prerequisite for future sympathetic and evaporative cooling of naturally occurring molecules. However, experimental investigation of collisions in this temperature regime is still in its infancy. Our cryofuge setup, the combination of cryogenic buffer gas cooling and centrifuge deceleration [1], produces slow molecular beams with densities of over $10^9/cm^3$. This allowes the observation of cold molecule-molecule collisions with large observed cross sections $> 10^{-12}cm^2$ for CH_3F and ND_3 [2]. Our experimental findings agree with theoretically modeled elastic and inelastic collisional loss rates. The low absolute velocity enables the straightforward loading of molecules into an electrostatic trap [3] making much more detailed studies possible due to longer interaction times. Such measurements are important, e.g., for future evaporative cooling experiments.

[1]S. Chervenkov et al., **Phys. Rev. Lett.** 112, 013001 (2014)
[2]X. Wu et al., **Science** 358, 645-648, (2017)
[3]B.G.U. Englert et al., **Phys. Rev. Lett.** 107, 263003 (2011)

Thomas Gantner
Max Planck Institute of Quantum Optics

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