Abstract Submitted
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A high density source of cold, slow and rotationally pure polar 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 — Cold polar molecules provide fascinating research possibilities in physics and chemistry. However, densities of cold and slow molecules achieved in past experiments have been unsatisfactory for many applications. The combination of cryogenic buffer gas cooling with our centrifuge decelerator solves this problem. We achieve a record high flux exceeding $10^{10}s^{-1}$ and densities up to $10^{9}cm^{-3}$ of internally cold polar molecules with a single state purity of up to 92% [1] at kinetic energies corresponding to less than 1K [2]. As the method only relies on the dipole moment, it is applicable to a wide range of even complex, polyatomic molecular species (ND_3, CH_3F, CF_3CCH, etc.). Besides enabling detailed collision studies our technique could serve as an ideal source for trapping and cooling experiments.

[1]X. Wu et al., **ChemPhysChem** 17, 3631, (2016)
[2]X. Wu et al., **Science** 358, 645, (2017)

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