

Abstract Submitted
for the DAMOP17 Meeting of
The American Physical Society

Nondestructive Detection of Polar Molecules via Rydberg Atoms

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Research on cold and ultracold molecules is impeded by the difficulty in many cases to efficiently detect molecules, with the choice of molecule species often influenced by the need for a suitable detection scheme. We demonstrate the possibility to efficiently and nondestructively detect basically any polar molecule species using Rydberg atoms [1]. A Rydberg atom senses the presence of a molecule based on Förster resonance energy transfer. We show that huge interaction cross sections of more than 10^{-6} cm^2 exist for low collision energies, allowing for efficient detection [1]. First experimental results on detection of room temperature ammonia molecules with Rubidium Rydberg atoms will be presented. [1] M. Zeppenfeld, arXiv:1611.08893 [physics.atom-ph] (2016).

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Date submitted: 27 Jan 2017

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