Progress in trapping rubidium molecules

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We have recently observed the formation of ultracold rubidium molecules in the triplet ground state at a temperature of about 90 µK inside a Rb MOT [1]. The most efficient formation has been found to go through photoassociation to the excited \( ^0\)\( g \) \( (P_{3/2}) \) state and successive radiative decay to the \( ^3\Sigma_u^+ \) ground state [2]. In this way up to \( 10^4 \) mol/s are produced. These molecules remain in the MOT region for nearly 10 ms before falling due to gravity and to the residual velocity; this actually limits any possible experiment with them. To increase the storage timescale, trapping of the molecules must be obtained.

We are setting up an optical dipolar trap using a CO\(_2\) laser to confine rubidium molecules. This kind of trap, known as QUEST (quasi-electrostatic trap), has already been successful in trapping cesium molecules [3]. We shall describe the status of our experiment.


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