

Trapping of Rydberg atoms in tight magnetic microtraps

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We explore the possibility to trap Rydberg atoms in tightly confining magnetic microtraps. The trapping frequencies for Rydberg atoms are expected to be influenced strongly by magnetic-field gradients. We show that there are regimes where Rydberg atoms can be trapped. Moreover, we show that so-called magic trapping conditions can be found for certain states of rubidium, where both Rydberg atoms and ground-state atoms have the same trapping frequencies. Magic trapping is highly beneficial for implementing quantum gate operations that require long operation times.

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