

Rubidium Magnetic-Optical-Trap Reaction Microscope

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Abstract: We have built a set of magnetic-optical-trap reaction microscope which includes techniques of the preparation of cold atomic target, fast switch of magnetic field, and the load of high-density atom beam. And the set will be used for the research of such as the double ionization progress.

Reaction Microscope (ReMi) imposes gas targets on subjects of study due to the supersonic jet technique. For the materials of solid phase at room temperature, ReMi gives considerably low resolutions of momentum measurements. Here, we integrate two advanced experimental techniques, magnetic optical trap (MOT) and reaction microscope (ReMi), and develop a new approach with high resolution and multi-body coincident measurement. The magnetic-optical-trap reaction microscope (MOTReMi) (see Figure 1) is expected to be characterized that the atomic density reaches 10^9 cm^{-3} , the temperature is below 1mK, and the momentum resolution of ion is better than 0.1 a.u. For this goal, several techniques should be focused on, which are the preparation of cold atomic target, fast switch of magnetic field, and the load of high-density atom beam. The MOTReMi will be used for the research of double ionization [1] process and the electron correlation of hydrogen-like atom, as well as strong-field ionization of laser-prepared atomic states [2]. Here, the research progress of the set-up, the design and characterization of the whole vacuum cavity,

the source of cold atoms (2D MOT [3]) and the optical system is introduced particularly.



Figure 1. Set-up diagram of MOTReMi.

References

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