

The Multipass Cavity of the μHe^+ Lamb Shift Experiment

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A multipass laser cavity is presented which can be used to illuminate an elongated volume from a transverse direction. The illuminated volume can have a several cm^2 large transverse cross section. Convenient access to the illuminated volume for other experimental components is granted at a large solid angle. The multipass cavity is very robust against misalignment, and no active stabilization is needed. The scheme is suitable e.g. for beam experiments, where the beam path must not be blocked by a laser mirror, or if the illuminated volume has to be very large. Measurements of the intensity distribution inside the multipass cavity are found to be in good agreement with the simulation.

On this poster, the technical developments used to operate the cavity are presented, and an overview over possible applications is given: It was used for the muonic-hydrogen experiment in which $6\mu\text{m}$ laser light illuminated a volume of $7 \times 25 \times 176 \text{ mm}^3$, consisting of mirrors that are only 12mm in height. Furthermore it may be suited for transverse cooling of a beam of atoms/molecules (using two of such cavities) or the creation of a "light curtain" illuminating a region of about $20 \times 10 \text{ cm}^2$ over a distance of 1cm or more along the beam axis.

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