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Design and characterization of a ring cavity with a flat-top profile[1]
YANETH TORRES, ALEJANDRA LOPEZ, MARISOL BILLION, WANDERSON PIMENTA, UASLP, JOHN FRANCO, CONACyT-UASLP, EDUARDO GOMEZ, UASLP — Optical cavities are used to improve the atom interferometry techniques, providing spatial filtering of the interferometry beam and the use of relatively low input beam power due to the resonant enhancement of the intracavity power. In the present work, we report the design and characterization of a bow-tie cavity of high-quality-factor composed oftwo curves and two planar mirrors. The geometry of the cavity is chosen to be able to interact with a cloud of trapped atoms with a beam as homogeneous as possible. We lock the laser to the cavity to have a stable field using the Pound-Drever-Hall technique. We experimentally demonstrate the generation of a flat-top light profile inside the cavity by the superposition of the LG-00and -01modes. The ring cavity is not confocal; thus the transverse modes are not degenerate. We inject two independent transverse modes to the cavity that are separated by 200 MHz in frequency. The total intensity given by the interference of the two modes can be well understood in terms of the addition of the intensities of individual fields since the difference in frequency of the fields is larger than the Rabi frequency of any relevant atomic transition.

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Yaneth Torres
UASLP

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