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Measurement of cold atoms' distribution in a closed system¹

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— In this paper, we present an experiment to measure the spatial distribution of cold atoms in a ceramic cell. The cold atoms are first cooled by diffuse light produced by multiple scattering of laser light by inner surface of the cell. An inhomogeneous magnetic field is applied after the atoms are cooled by using a pair of anti-Helmholtz coils, and thus the shift of atomic magnetic sub-levels is position-dependent. We move the anti-Helmholtz coil horizontally while keeping the probe laser beam resonant with the cold atoms at the zero magnetic field. The absorption of the probe beam gives the number of cold atoms at different position. The results show that at the center of the cell, less atoms exist due to the leakage of diffuse light into the hole connecting to the vacuum pump. The method we developed in this paper is useful to detect cold atoms in a region where imaging is not possible.

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