

Abstract Submitted
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New guiding structures for atom interferometry with cold atoms¹

ALEXEY TONYUSHKIN, MARA PRENTISS, Harvard University — We demonstrate new magnetic guides for cold atoms suitable for atom interferometry experiments. These guides are based on macroscopic copper tape coils that allow the guide to be located more than a cm above the surface of the coils. Thus, unlike microchip structures that require that the atoms be very close to the surface of the chip, these structures can be placed outside the vacuum chamber. The large operational distance reduces decoherence due to waveguide imperfections. This distance is comparable to the one previously achieved with ferromagnetic guide; however, the new guides offer precise control over the magnetic field, though they do require relatively high current. The guides with two different geometries are developed based on such coils, where in one case the atoms are located above the coils and in the other case the atoms are located symmetrically between the coils. The symmetrical version of the guide has a much lower magnetic field curvature than the other macroscopic guides have. The guides can also be used for nonlinear optics experiments with cold atoms.

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