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Simulating the Aharonov-Bohm effect in scattering of cold paramagnetic atoms in a cylindrically symmetric magnetic field[1] BERNARD ZYGELMAN, University of Nevada, Las Vegas — We consider the scattering of spin 1/2 atoms in a cylindrically symmetric magnetic field. Expanding the total wavefunction in a Born-Oppenheimer (or adiabatic) basis we obtain coupled equations in which a non-Abelian vector gauge potential is induced. For collision energies in which one of the Zeeman- split channels is closed, we show that the open-channel equation is equivalent to that describing Aharonov-Bohm scattering. We calculate the scattering amplitude, for the open channel, using the fully coupled equations and compare it to that predicted by Aharonov-Bohm scattering. We also discuss planar collisions of two spin-1/2 atoms that interact through the magnetic dipole-dipole interaction, and show the relationship with the system considered above.

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