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Magic optical trapping of Rydberg atoms[1] SIYUAN ZHANG[2], GANG LI[3], LARRY ISENHOWER, MARK SAFFMAN, University of Wisconsin
— We demonstrate trapping of both ground and Rydberg excited Cesium atoms in an optical bottle beam trap. The trap is generated by crossing two tightly focused Laguerre-Gaussian LG_{01} beams. This generates a dark region completely surrounded by light which is needed to trap Rydberg states which have negative polarizability. If the wavelength of light is chosen to also have a negative polarizability for the ground state then both states will be trapped. We demonstrate a trap lifetime for the Cs $61d_{3/2}$ state of 360 μs and a trap induced ground-Rydberg transition shift on the order of 100 kHz.

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