

Abstract Submitted
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Transfer of Orbital Angular Momentum from Laguerre Gaussian Beam to Trapped Rydberg Atoms Koushik Mukherjee, Department of Physics, IIT Kharagpur, Kharagpur-721302, India., Pradip Mondal, Department of Physics, Egra S.S.B. College, Egra-721429, India., Sonjoy Majumder, Department of Physics, IIT Kharagpur, Kharagpur-721302, India., Bimalendu Dev, Department of Materials Science, IACS, Jadavpur, Kolkata 700032, India. — The transfer mechanism of the orbital angular momenta (OAM) of light to trapped ground-state atoms under paraxial approximation is well known. Here, we show the formalism of transferring optical OAM, under paraxial approximation, from a Laguerre-Gaussian(LG) beam to trapped Rydberg atoms. Our derivation shows that optical OAM can be directly transferred or shared to the electronic state of Rydberg atom at the level of dipole transitions. The Gaussian part of the profile of the LG beam, which is generally neglected, is found to have an important effect on the OAM transfer to the Rydberg atoms. Our numerical calculations using Rydberg Rubidium atoms trapped in a harmonic potential show that the otherwise forbidden transitions become sufficiently probable.

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