

Abstract Submitted  
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**Reduced volume and reflection for optical tweezers with radial Laguerre-Gauss beams** JEAN-BAPTISTE S. BÉGUIN, ZHONGZHONG QIN<sup>1</sup>, Norman Bridge Laboratory of Physics, California Institute of Technology, Pasadena, California 91125, USA, JULIEN LAURAT, Laboratoire Kastler Brossel, Sorbonne Université, CNRS, ENS-Université PSL, Collège de France, 4 Place Jussieu, 75005 Paris, France, XINGSHENG LUAN, ALEXANDER P. BURGERS<sup>2</sup>, H. JEFF KIMBLE, Norman Bridge Laboratory of Physics, California Institute of Technology, Pasadena, California 91125, USA — Our progress to develop advanced capabilities for the integration of cold atoms and nanophotonics is documented at <https://doi.org/10.1364/OPTICA.384408>. At DAMOP we will describe a critical new component of this effort related to coherent superpositions of radial Laguerre-Gauss beams that lead to tightly focused optical tweezers with reduced volume and increased particle trapping frequency. Beyond free-space, such superpositions can enable the efficient transport of atoms via optical tweezers directly to trap sites near the surfaces of nanoscopic optical devices. More generally, the rapid variation of the Gouy phase for wavelength-scale focal regions could enable phase-contrast microscopy within heterogeneous sample volumes.

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