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The Forgotten Quantum Number: The Radial Modes of Laguerre-Gauss Beams ANTON ZEILINGER, WILLIAM PLICK, MARIO KRENN, SVEN RAMELOW, University of Vienna — The orbital angular momentum quantum number of Laguerre-Gauss beams has received an explosively increasing amount of attention over the past twenty years. However, often overlooked is the so-called radial number of these beams. We present a quantum-mechanical operator formalism of this “forgotten” quantum number. We place an emphasis on the detailed understanding of the physical interpretation of this formalism, including its connection to concrete physical observables and conjugate variables. We then draw some connections between this new formalism and the effect the radial number has on beam stability with possible application to quantum communication.

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