

Abstract Submitted
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Rayleigh scattering as a probe of higher-order mode propagation in an optical nanofiber¹ FREDRIK K. FATEMI, Naval Research Laboratory, JONATHAN E. HOFFMAN, JQI, Dept. of Physics, UMD, and NIST, College Park, MD 20742, GUY BEADIE, Naval Research Laboratory, STEVEN L. ROLSTON, LUIS A. OROZCO, JQI, Dept. of Physics, UMD, and NIST, College Park, MD 20742 — Optical nanofibers can have large evanescent fields that create strong interactions with atoms. To increase the complexity of the potential landscape, recent studies have explored the use of higher-order modes. However, with several propagating modes in the nanofiber, the challenge remains of controlling the field distribution on the nanofiber waist. Here, we describe imaging Rayleigh scattered light to analyze the spatial evolution of the propagating fields throughout the entire nanofiber, including the transition from core-cladding guidance to cladding-air guidance. By measuring local beat lengths between higher-order modes in situ, we identify and systematically control the modal composition. These measurements also provide a non-destructive tool for determining variations in the waist radius to below 3 nm using entirely optical means.

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