Observation of diffraction-free submicrometer visible laser beam propagation through nanodisordered ferroelectrics

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Abstract:

We report the observation of the propagation of visible beam with an intensity full-width-at-half-maximum of 0.8 micrometers without diffraction through 6 millimeters of nano-disordered potassium-tantalate-niobate. The effect is observed after the photorefractive ferroelectric is subject to a rapid temperature hump below its Curie point and is attributed to the emergence of scale-free optical propagation. The result amounts to extending the depth of focus of a high-aperture microscope through the crystal length, permitting the transfer of high resolution pixel visible images without distortion.