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**Sridharan et al.**

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(54) **DIFFRACTIVE OPTICAL ELEMENTS FOR TRANSFORMATION OF MODES IN LASERS**

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(58) **Field of Classification Search**  
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See application file for complete search history.

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(\* ) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

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(57) **ABSTRACT**  
Spatial mode conversion modules are described, with the capability of efficiently transforming a given optical beam profile, at one plane in space into another well-defined optical beam profile at a different plane in space, whose detailed spatial features and symmetry properties can, in general, differ significantly. The modules are comprised of passive, high-efficiency, low-loss diffractive optical elements, combined with Fourier transform optics. Design rules are described that employ phase retrieval techniques and associated algorithms to determine the necessary profiles of the diffractive optical components. System augmentations are described that utilize real-time adaptive optical techniques for enhanced performance as well as power scaling.

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**8 Claims, 13 Drawing Sheets**

