

## HIGH-POWER PURE STRUCTURED LIGHT FOR BIOMEDICAL APPLICATIONS

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Keywords: optics, high power, optical orbital momentum, lasers

Light revolutionized our vision of technology. Carrying five internal degrees of freedom, it offers unlimited capabilities in light-matter interactions. By tailoring the light properties, it is possible to manipulate the light-matter interaction at a higher degree of control by activating the desired effects. As it was recently predicted high-power structured light can generate a strong solenoidal magnetic field by means of the inverse Faraday effect in plasma environment [1]. This opens a pathway to more efficient and compact medical isotope separation systems or downscaling of Laser Wakefield Acceleration (LWFA) down to just tens of meters. The further increasing demand for controlling the light states catalyzes technological innovations in laser-based systems. In this presentation, I will focus on our recent advances in developing laser systems capable of delivering high power optical vortices with exceptionally high modal purity (Fig.1). By employing a coherent beam combining technique, we enable the power scaling of short pulsed high dimensional optical vortices up to 100 W of average power improving our previous results by the factor of 1000 [2]. The beams are featured of high modal purity varied between 92 and 97% depending on the topological charge of vortices.

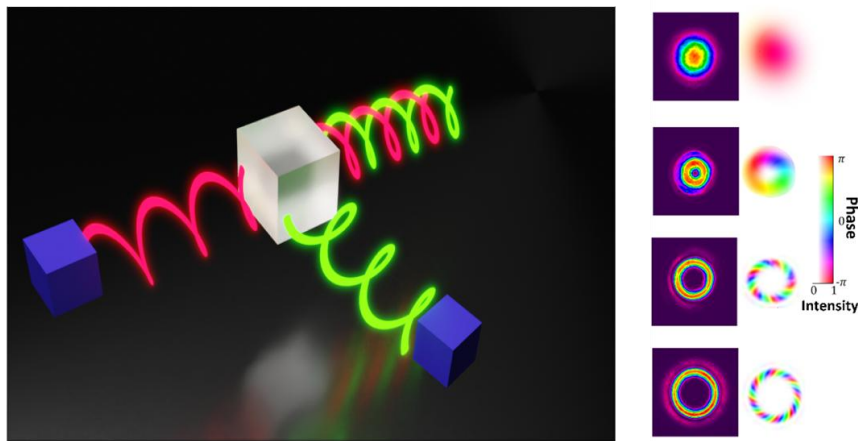


Fig. 1: Coherent beam combining of high-dimensional optical vortices in two-channels laser system.

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