

Gravitational lensing in the laboratory using designer optical beams

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ABSTRACT

The advent of electronic holography has made possible numerous advances in generating light beams in complex light modes with unique properties, containing for example, optical singularities to manipulate matter and high dimensionality of spatial modes for communications. In this work we use this technology to investigate gravitational lensing in the laboratory, and probe aspects of it that are not possible to investigate via direct astrophysical observations. Gravitationally lensed light contains a rich array of optical singularities, such as caustics and optical vortices. These can be used to infer the properties of astrophysical objects.