

Abstract Submitted  
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**Self-guiding of laser pulses and spatio-temporal optical vortices in plasma**<sup>1</sup> GEORGE HINE, NIHAL JHAJJ, University of Maryland College Park, HOWARD MILCHBERG, University of Maryland — Relativistic self-focusing and self-guiding are processes fundamental to laser-plasma particle acceleration. Recent work in optical filamentation has discovered the existence of spatio-temporal optical vortices (STOVs) [1] and has shown their integral connection to all self-focusing collapse and self-guiding scenarios. Here we show that STOVs are an essential feature of LWFA through their generation by relativistic self-focusing. Three dimensional particle-in-cell (PIC) simulations show the formation of STOVs in the pulse, corresponding to vortical flow of the Poynting vector, which then influences subsequent pulse propagation such as the self-healing of the relativistic self-guiding process.

[1] N. Jhajj *et al.* *arXiv:1604.01751[physics.optics]*

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