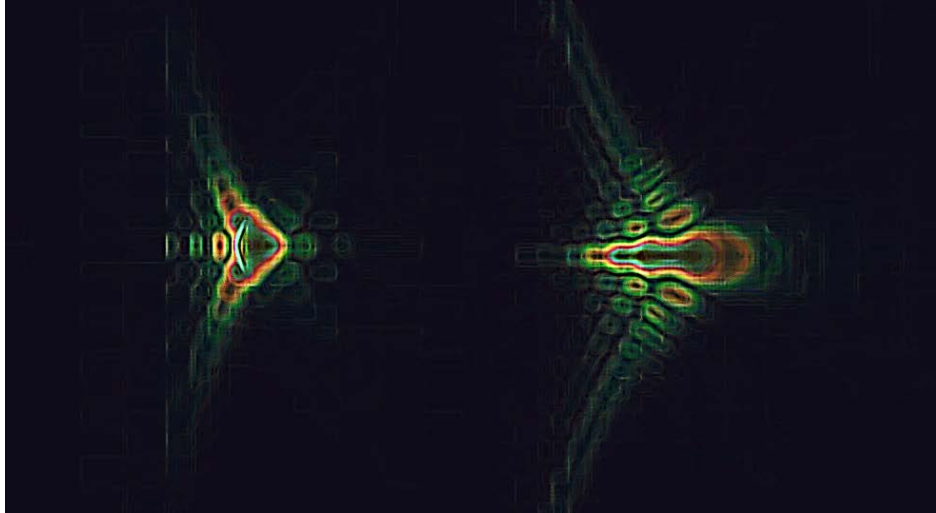


# Transformation optics enabled access to extreme spatiotemporal localization of light in matter

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Tightly focused ultrashort laser pulses are used in many applications including laser machining of materials, eye surgery, and nanoprocessing of biological cells. Also, the high intensities that can be achieved under such conditions enable warm dense matter studies and the observation of exciting new material states. Simulations though of such extreme systems proved to be until today a tedious and unrealistic task.

We have found a way to access these complex problems through a robust and elegant approach, which is based on transformation optics, and where we simply map the problem to one that can be solved with scalar wave equations. Our solution is expected to enable access to challenging problems that were until now practically inaccessible.

More information can be found in:

**V. Y. Fedorov, M. Chanal, D. Grojo, and S. Tzortzakis**, "Accessing Extreme Spatiotemporal Localization of High-Power Laser Radiation through Transformation Optics and Scalar Wave Equations," [Phys. Rev. Lett. \*\*117\*\*, 043902 \(2016\)](#).