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Assessing picosecond two-photon lithography as a versatile alternative to femtosecond systems

ABSTRACT

Two-photon lithography (TPL) enables true 3D micro- and nanofabrication with sub-diffraction resolution through nonlinear absorption confined to the focal volume. This ongoing project explores the potential of a custom TPL platform based on a picosecond pulsed laser, investigating whether this regime can represent a practical alternative to the femtosecond standard. The current work focuses on a literature-driven comparative study to identify achievable resolution, voxel dimensions, and fabrication fidelity reported for picosecond versus femtosecond sources. These benchmarks will guide the experimental implementation and parameter exploration (power, scan speed, numerical aperture, exposure time), aiming to define realistic performance limits and assess under which conditions picosecond TPL can provide competitive results for accessible high-resolution microfabrication.

BIOGRAPHY

Luca Bortot is a Master's student in Physics of Matter at the University of Padova, specializing in optics and materials. His academic interests focus on light-matter interaction, photonics, and experimental optical systems. He is currently beginning his thesis project on the development of a custom two-photon lithography setup using a picosecond laser source. His work aims to explore practical and scalable approaches to advanced laser microfabrication.

Author: BORTOT, LUCA

Co-authors: GUIDOLIN, Chiara (Department of Physics and Astronomy "G. Galilei", University of Padua, Padua, Italy); FERRARO, Davide (DFA - UNIPD); PISANO, Filippo (Department of Physics and Astronomy "G. Galilei", University of Padua, Padua, Italy; Padova Neuroscience Centre, University of Padua, Padua, Italy); LEGNARO, Rebecca

Presenter: BORTOT, LUCA

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