

Special Issue

High-Power Laser Physics and Technology: From Fundamental Strong-Field Interactions to Industrial Applications

Message from the Guest Editors

This Special Issue is dedicated to the rapidly advancing domain of high-power laser physics and technology, tracing the path from fundamental strong-field science to practical, high-impact industrial solutions. Contributions will explore the newest insights into laser-matter interactions at relativistic intensities, including attosecond pulse generation, plasma-based particle acceleration, and nonlinear QED phenomena. Emphasis is placed on innovative amplifier concepts—such as OPCPA, coherent beam combining, and cryogenic Yb:YAG or Ti:sapphire systems—that push peak and average powers beyond the petawatt frontier. Diagnostics enabling spatio-temporal characterization of ultra-short, ultra-intense beams will also be highlighted. Cross-disciplinary studies on thermal management, adaptive optics, machine-learning control, and radiation-hardened components will further illustrate the transition from laboratory curiosity to robust, turn-key systems. By uniting fundamental researchers, laser engineers, and end-users, this collection aims to chart the roadmap for the next decade of high-power laser innovation across science and industry.

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You are invited to contribute a research article or a comprehensive review for consideration and publication in *Photonics* (ISSN 2304-6732). *Photonics* is an online open access journal covering both the fundamental and applications of optics and photonics. *Photonics* strives to provide an avenue to allow authors to disseminate their scientific findings—both theoretical/ simulations and experimental works—in highly accessible peer-reviewed journal publications. The manuscript in *Photonics* will be handled with quick turnaround production processing time. We welcome authors to submit their manuscripts for publications in *Photonics*. Our goal in *Photonics* is to enable fast dissemination of high impact works to the scientific community.

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