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Edward W. Taylor
David A. Cardimona
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Introduction

This volume contains papers presented at the SPIE Optics + Photonics conference entitled *Nanophotonics and Macrophotonics for Space Environments IX*. The conference proceedings are primarily comprised of in-progress and advanced research and development in a variety of photonic-based technologies for improving many current space technology applications.

The papers contained within the proceedings are authored by academic, industrial, and government agencies involved in investigating, designing, testing and analyzing photonic concepts, the survivability and reliability of components, and systems for potential and near-term operation in adverse space environments. Of particular interest are space effects that can degrade space technologies, such as near-Earth ionization and displacement radiation, temperature cycling, micrometeorite impacts, interactions with asteroids and comets, and other cosmic events encountered in interstellar and space exploration missions.

Within the proceedings are papers dealing with recent investigations and advances in photonic-based designs for directed-energy fiber-optic laser arrays for planetary defense concepts and future space exploration missions. A variety of polymer, organic and hybrid materials for efficient energy harvesting in space, and recent advances in radiation hardened semiconductors for applications requiring improved components (such as ring lasers, photoconductors, photovoltaic cells and radiation hardened IR detectors) are included in this volume.

Among the many innovative concepts found within these proceedings are applications and relatively new concepts involving the use of atomic clock Rb-based materials and vertical cavity emitting laser technologies for accomplishing radiation hardened space applications, such as precision interferometry sensors, inertial navigation systems, precision time keeping, and fast light enhanced optical gyroscopes. Discussed within these topic areas are novel approaches for achieving stable, light-weight systems and tunable single frequency operation that exceed present-day conventional systems. Of particular interest is the reported developmental progress of inertial navigation systems based on atomic interferometry, which would allow GPS-level precision in a GPS-free or GPS-jammed environment.

The chairs wish to thank the program committee, co-chair, session chairs, authors, and especially the SPIE staff for their excellent assistance and efforts for making this conference a success.

Edward W. Taylor
David A. Cardimona