## Call for Papers

## *IEEE Journal of Selected Topics in Quantum Electronics*

# Special issue on Inverse Design of Photonic Applications Using Quantum and Classical Computing

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**Scope and Topics**

The integration of inverse design methodologies with photonic technologies has opened new frontiers in how we formulate, discover, and realize complex optical systems. Inverse design leverages advanced optimization algorithms, ranging from physics-based adjoint gradient methods that enable efficient, deterministic optimization to data-driven machine learning frameworks that allow exploration of vast and unconventional design spaces. With the advent of quantum computing, the field is experiencing a paradigm shift, enabling unprecedented opportunities in tackling computationally intractable design problems beyond the reach of classical resources.

By leveraging both classical high-performance computing and emerging quantum algorithms—individually and in hybrid workflows—researchers are beginning to solve inverse design challenges for photonic systems with enhanced efficiency, scalability, and physical insight. These advances promise transformative impacts on applications spanning communications, energy, sensing, computing, defense and security, and biomedical technologies.

The purpose of this issue of JSTQE is to highlight recent progress, challenges, and opportunities at the intersection of inverse photonic design, classical optimization, and quantum computing. Areas of interest include (but are not limited to):

Fundamentals of Inverse Photonic Design
· Adjoint methods, topology optimization, and evolutionary algorithms for photonic systems
· Machine learning and artificial intelligence approaches for design automation
· Multiphysics optimization integrating optics, thermal, and mechanical domains

Quantum Computing for Photonic Inverse Design
· Quantum-inspired algorithms and hybrid quantum-classical strategies
· Variational quantum algorithms for large-scale photonic optimization
· Quantum annealing approaches for combinatorial optimization
· Benchmarking quantum approaches against classical solvers

Novel Photonic Structures and Platforms via Inverse Design
· Metasurfaces, photonic crystals, and nanophotonic devices
· Integrated photonics, waveguide networks, and fiber-based designs
· Inverse-designed optical coatings, laser cavities, detectors, and nonlinear optical devices

Applications and Emerging Directions
· Photonic systems for quantum information science and quantum networks
· Energy harvesting and radiative cooling enabled by inverse design
· Optical interconnects, neuromorphic photonics, and AI hardware accelerators
· Multiscale design workflows bridging nanoscale to system-level photonics

**Call for Reviewers**
If you work in this area and are interested in reviewing for this special issue, please email your CV to Venkata Karthik Yadav Penna venkatakarthikyadav.penna@kaust.edu.sa

**Submission Guidelines**
Submissions will be reviewed in accordance with the normal procedures of the Journal and papers must be formatted according to the Information for Authors found at:
https://ieeephotonics.org/publications/journal-of-selected-topics-in-quantum-electronics/

- Manuscript and Graphical Abstract Submissions should be made online at https://ieee.atyponrex.com/journal/jstqe-pho**.** Graphical abstracts are strongly suggested.
- Select the paper type "Special Issue on Inverse Design of Photonic Applications Using Quantum Computing"

**Important Dates**
Open for Submissions: December 1, 2025
Submission Deadline: June 1, 2026
Tentative Publication: March/April 2027

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