31ST INTERNATIONAL CONFERENCE ON OPTICAL NETWORK DESIGN AND MODELLING

CALL FOR PAPERS

In line with previous editions, ONDM 2027 invites contributions on cutting-edge research advances in optical network engineering, covering the data, control and/or management planes, all the segments (access, metro and core), as well as hot topics like fiber sensing, AI/ML use cases and new fiber types. The scope of the conference also includes the design and modelling of networks based on advanced photonic, packet transport and wireless technologies integrated with optical networks.

ONDM 2027's edition motto is: "Building the All-Optical Fabric for Sustainable AI"

The continuous growth of data-driven applications — from immersive extended reality and autonomous mobility to large-scale AI training and distributed inference — is pushing optical network infrastructures to their limits. Meeting these demands requires fundamental and diverse improvements on the optical fabric, becoming more programmable and autonomous while attaining superior sustainability. Tomorrow's networks must self-adapt to dynamic traffic conditions, support stringent and heterogeneous service requirements, and do so across every segment of an increasingly disaggregated ecosystem. Beyond connectivity, the optical fabric is also emerging as a sensing substrate, enabling real-time environmental and network state awareness that feeds directly into closed-loop control.

At the heart of this transformation lies a powerful convergence between artificial intelligence and optical technologies, comprising machine learning-driven optimization, AI-assisted quality-of-transmission estimation, and closed-loop autonomous control operations. Increasingly, agentic AI systems — capable of goal-driven reasoning, multi-step planning, and autonomous decision-making — are poised to take network intelligence beyond reactive automation toward truly self-managing optical infrastructures. Yet this convergence cuts both ways — as AI reshapes optical networking, optical networking must in turn rise to sustain AI. The increased requirements on bandwidth and energy consumption by modern AI workloads place the all-optical fabric at the center of the sustainability challenge, making energy-aware design not a constraint, but a core architectural principle.

The scope of the conference includes, but is not limited to, the following topics:

- Multi-mode/few-modes/multi-core optical spatial division multiplexed (SDM) networks
- Multi-band optical switching and grooming
- Evaluation and impact of Hollow Core Fibers
- Benchmarking the scalability of network designs
- Zero-touch network and service management at scale
- Digital twin-based management and design
- Advances in optical network modelling and optimization
- Application of AI/ML in optical networks
- Fiber sensing use cases
- Advance routing and spectrum assignment in flex-grid flex-modulation optical networks
- Optical network availability, resilience, survivability, security and privacy
- Optical-packet transport
- Designing and optimizing large QKD networks
- Quantum Networks on the road to the Quantum Internet
- Optical networks exploiting photonic integrated circuits
- Visible light communications and networks
- Photonics-based non-terrestrial networks
- Free Space Optical communication
- Optical and wireless network convergence
- Novel and multidimensional optical network architectures
- Novel optical node designs including disaggregation and open optical line systems
- Intra-/inter-data center connectivity for cloud/edge computing
- Optical network control, management and orchestration including SDN and NFV solutions
- Slicing, service chaining, virtualization and multi-tenancy techniques
- Novel network telemetry and real-time monitoring technologies for optical networks
- Energy efficient and sustainable networks
- Optical networking in support of vertical industries
- Network function acceleration on Smart NICs In-network computing

SUBMISSION INSTRUCTIONS:

Authors are encouraged to submit either abstract / short papers (3 pages) or full papers (up to 6 pages) in standard IEEE conference style https://www.ieee.org/conferences/publishing/templates.html, describing original, unpublished research results, not currently under review by another conference or journal, addressing forefront research and development in the area of optical network design and modelling.

Authors of 3-page papers must ensure their papers are formatted correctly, i.e., they are exactly 3 completely filled pages. Only PDF files with all fonts embedded are accepted. Your submitted PDF file and registered EDAS account of a paper must list the same author(s), title and abstract. Papers where the PDF and EDAS account do not match the author(s), title, and/or abstract will be withdrawn by the Technical Program Co-Chairs.

Accepted papers for oral presentation will be published at IEEE Xplore and IFIP Open Digital Library. Accepted papers for poster presentation will be published at IFIP Open Digital Library. Selected ONDM 2027 papers will be considered for publication in an archival journal. The selection criteria include the conference paper's score, novelty and impact. The extensibility of the paper with significant new material is also a key requirement for inclusion in this Special Issue.

IMPORTANT DATES

Submission deadline: 18 January 2027

Acceptance notification: 5 April 2027

Camera ready submission: 19 April 2027

ORGANIZATION:

General Chair:

- Raul Muñoz, CTTC, Spain

TPC Co-Chairs:

- Ricardo Martínez, CTTC, Spain
- Dan Kilper, Trinity College Dublin, Ireland
- Carlos Natalino, Chalmers University of Technology, Sweden