

# Capability density is becoming an architectural driver

Pre-conference hypothesis: more sensing, bandwidth and control are being packed into smaller, lighter optical systems.

## THE SIGNAL

Across the published ICSO26 programme, compact payloads, integrated photonics and miniaturized optical communications repeatedly point toward the same architectural pressure: deliver more mission capability per unit of mass, volume and power.

### From discrete optical subsystems toward integrated platforms with higher capability density.

#### COMPACT LIDAR

##### Towards a Compact Flash LiDAR for Spaceborne Proximity Operations

CSEM SA

#### Observation

Experimental work around a compact instrument.

#### Implication

Proximity sensing may fit tighter SWaP envelopes.

#### INTEGRATED PHOTONICS

##### Photonic integration across sensing and communications

Multiple programme threads

#### Observation

PICs and integrated optical functions recur across domains.

#### Implication

Integration moves from component choice toward system architecture.

## WHAT WE WILL TEST AT ICSO26

The final report will test whether the apparent pattern survives full-paper review, measured results and conference discussions - and where integration creates new qualification, thermal, alignment or verification risk.

## WHY IT MATTERS

For system teams, capability density changes trades across optics, control, processing and thermal design. For component suppliers, manufacturability, radiation tolerance and integration become part of the value proposition.

# COTS moves upstream into space optics

Pre-conference signal: commercial components are increasingly being evaluated as candidates for qualified and flight-relevant optical systems.

## EVIDENCE STRENGTH

11 published presentation abstracts explicitly reference COTS / commercial off-the-shelf components. The examples span optical communications, WDM, photonic integrated circuits, quantum links, OGSE, fiber gyros and SmallSat payloads.

**The emerging question is no longer simply "Can COTS work?" but "How efficiently can commercial technology be screened, adapted and qualified for space?"**

## WDM / PHOTONICS

### The Astromux project on WDM technologies tested for space

RINA Consulting

#### Observation

Commercial WDM technologies are being tested for space use.

#### Implication

Qualification may become the bridge between terrestrial scale and space readiness.

## PIC RADIATION

### Evaluation of TID Sensitivity of PICs

Airbus Defence and Space

#### Observation

COTS photonic devices are evaluated under total ionizing dose.

#### Implication

Radiation screening becomes a sourcing and architecture decision.

## COHERENT FSO

### Real-time demonstration of 2.5 GBaud coherent free-space optical communication

German Aerospace Center (DLR)

#### Observation

Commercial FPGA and converter technology supports a coherent link demonstrator.

#### Implication

Custom silicon may not always be required to reach useful performance.

## INTERPRETATION

This is an emerging cross-cutting signal, not yet a conference conclusion. The final report will check full papers and conference evidence to separate prototype convenience from credible qualification and flight adoption.