

Unlocking Free Space Optical Communications with Ultrafast Lasers: from Research to Deployment

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OUR COMPANY

Complete Laser-Based Solutions with FYLA Technology

- Only fiber laser manufacturer in Spain: FYLA
- Founded in 2014
- Team > 25 people
- Sales in > 30 countries
- Patents: 10 international families
- International Awards

Supplying prestigious universities worldwide:



ULTRAFAST LASERS

High repetition rate, ultra-short pulses

Ultra-short pulses

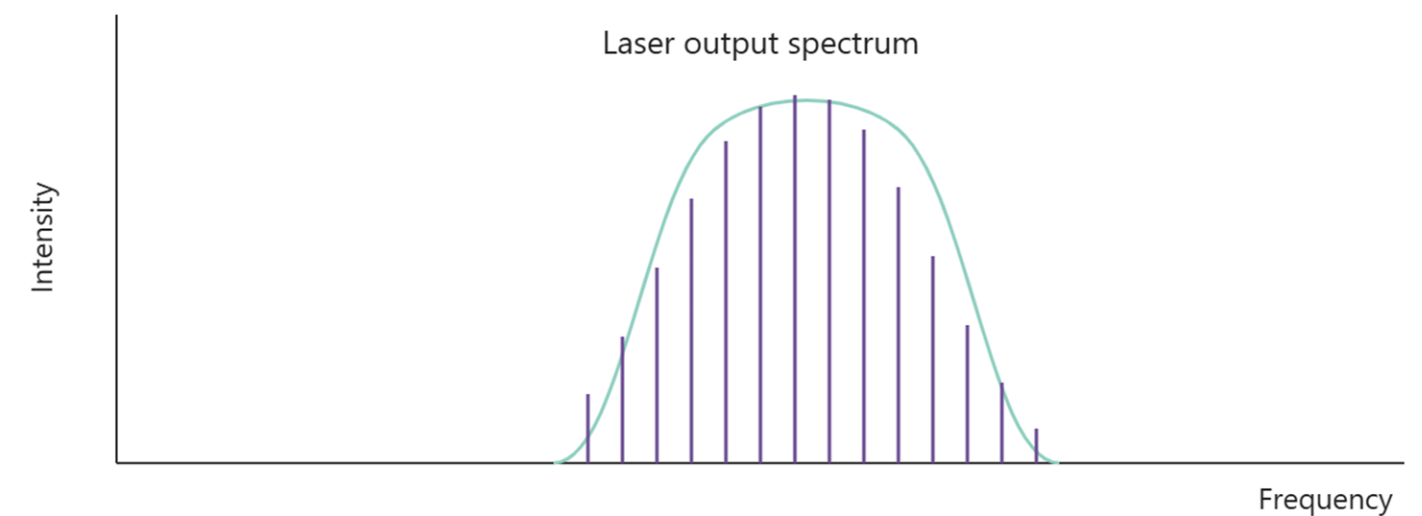
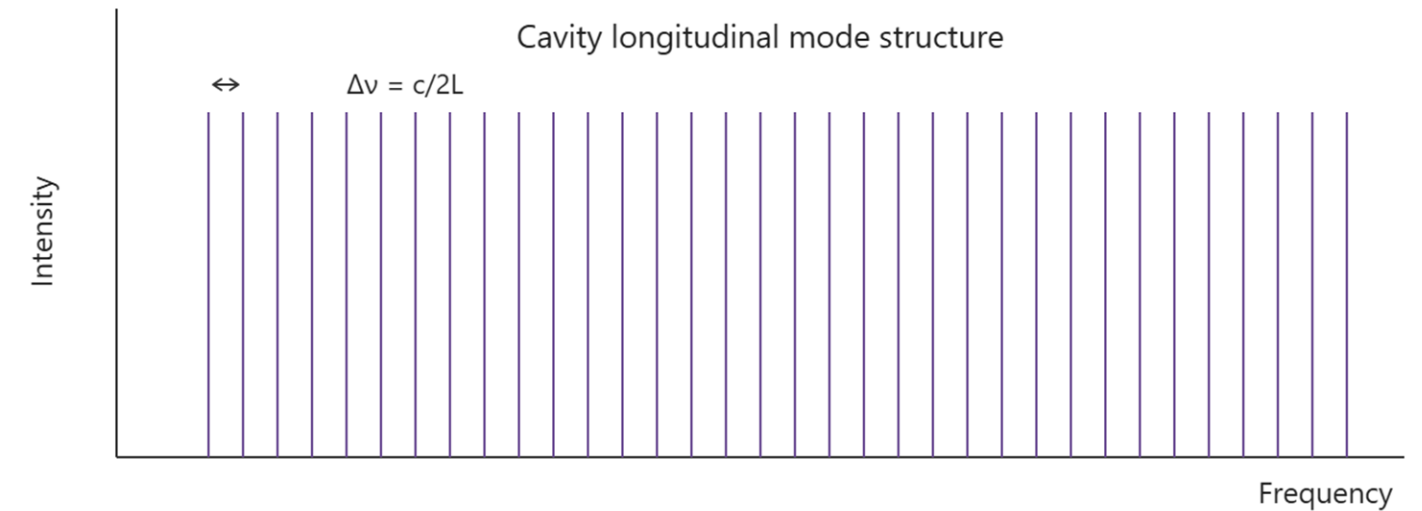
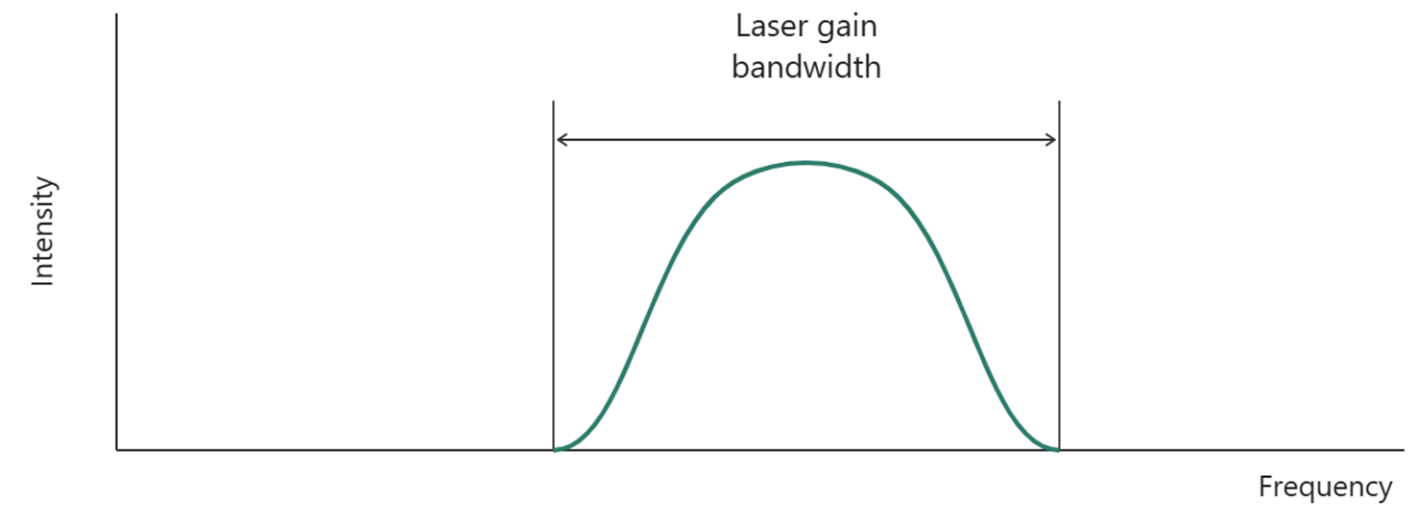
Durations from picoseconds down to femtoseconds concentrate energy into extremely short bursts, giving very high peak power for the same average power

High repetition rate

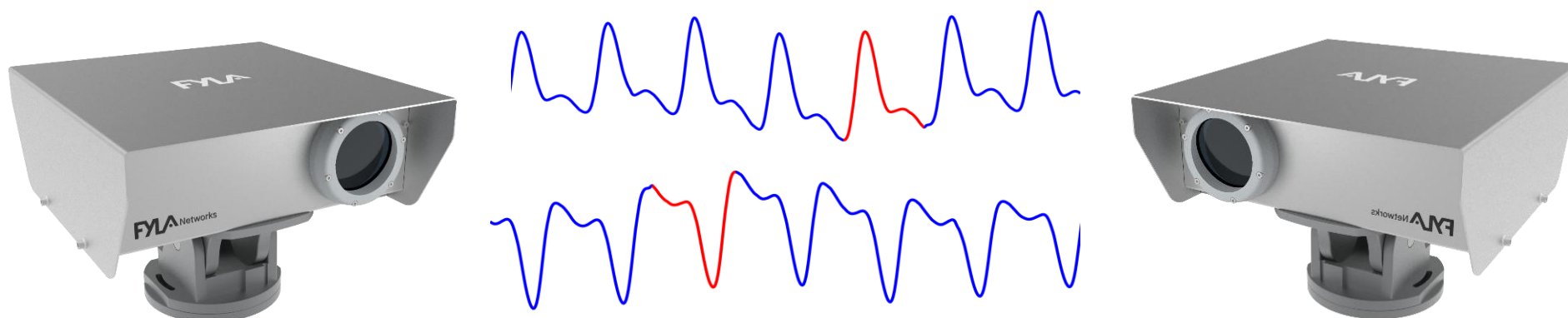
From MHz up to GHz rates

Broadband

All the longitudinal modes coexist inside the gain bandwidth obtaining a broadband output



FYLA Networks



Source type	FYLA Ultrafast laser
Central Wavelength	1.5 μm
Average Output Power	<0.5 W
Data Rate	1.25 Gbit/s 2.5 Gbit/s* 10 Gbit/s*

Under development*

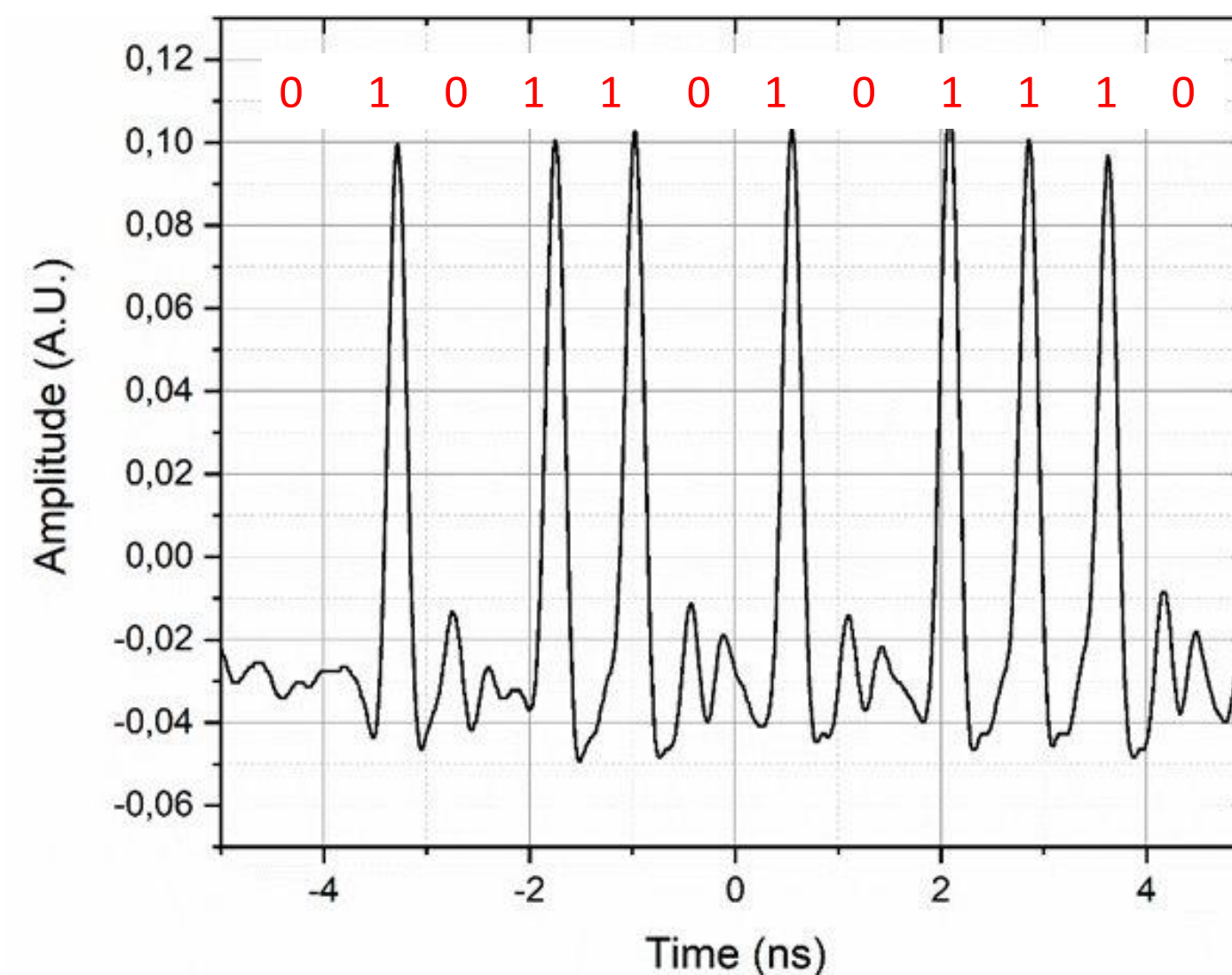
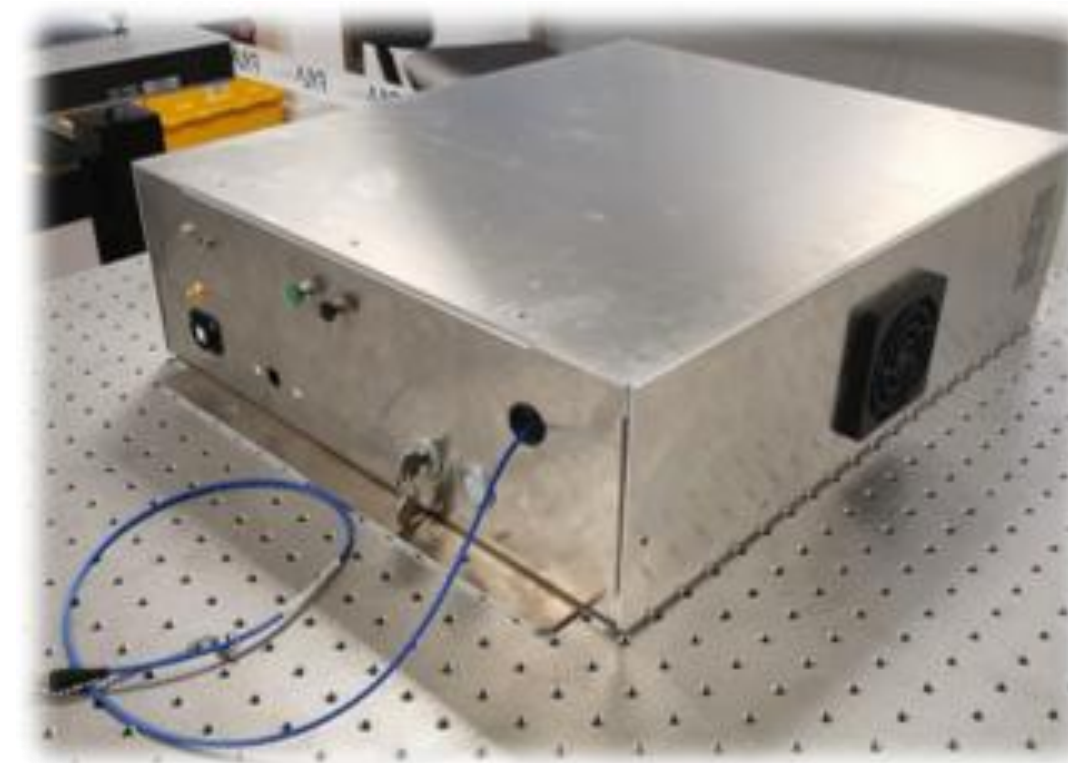
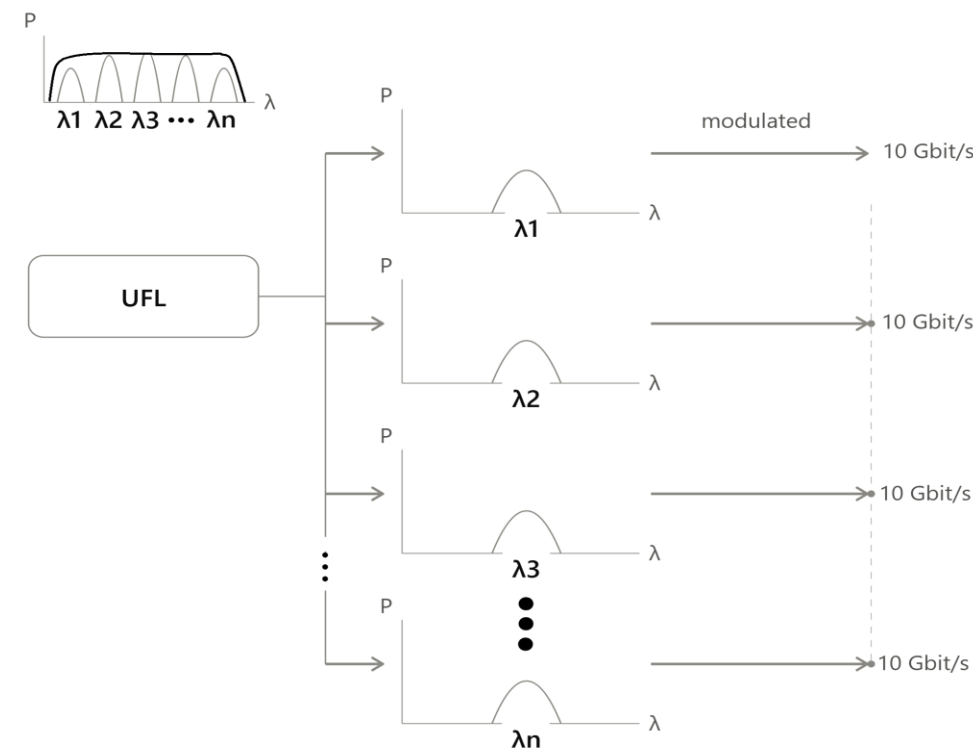


Fig. Transceiver output modulated with OOK

WHY ULTRAFAST LASERS?

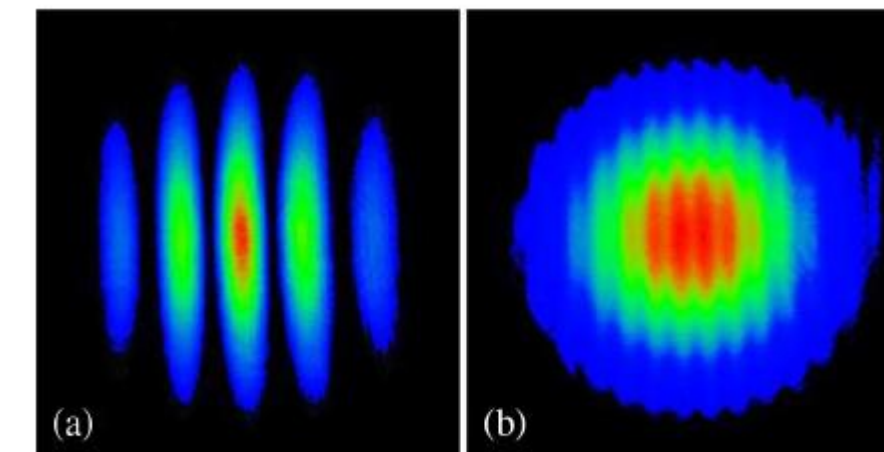
WDM channel capacity with one source



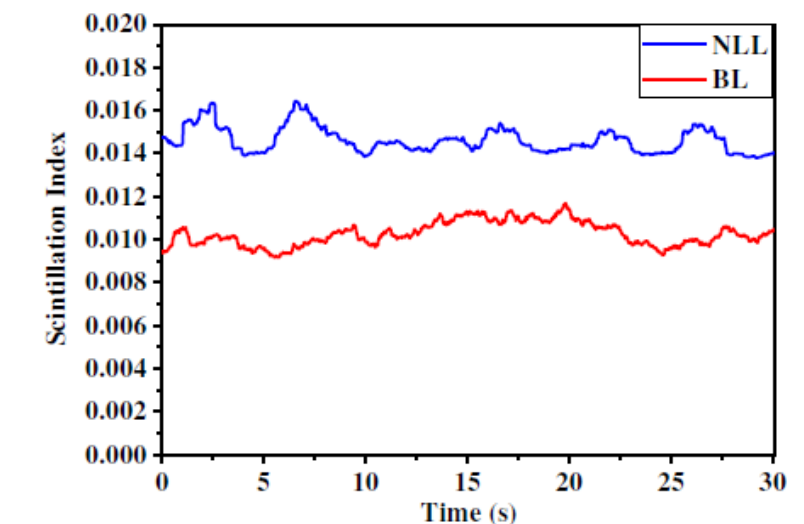
Marin-Palomo et al., Opt. Express 27, 31110-31129 (2019). 38 WDM channels, 10.68 Tbit/s using a quantum-dash MLL.

Kemal et al., Opt. Express 27, 31164-31175 (2019). 23-channel coherent WDM using a quantum-dash MLL as both source and LO.

Reduced scintillation — partially coherent source



Michelson interference patterns of (a) NLL pulses and (b) BL pulses.

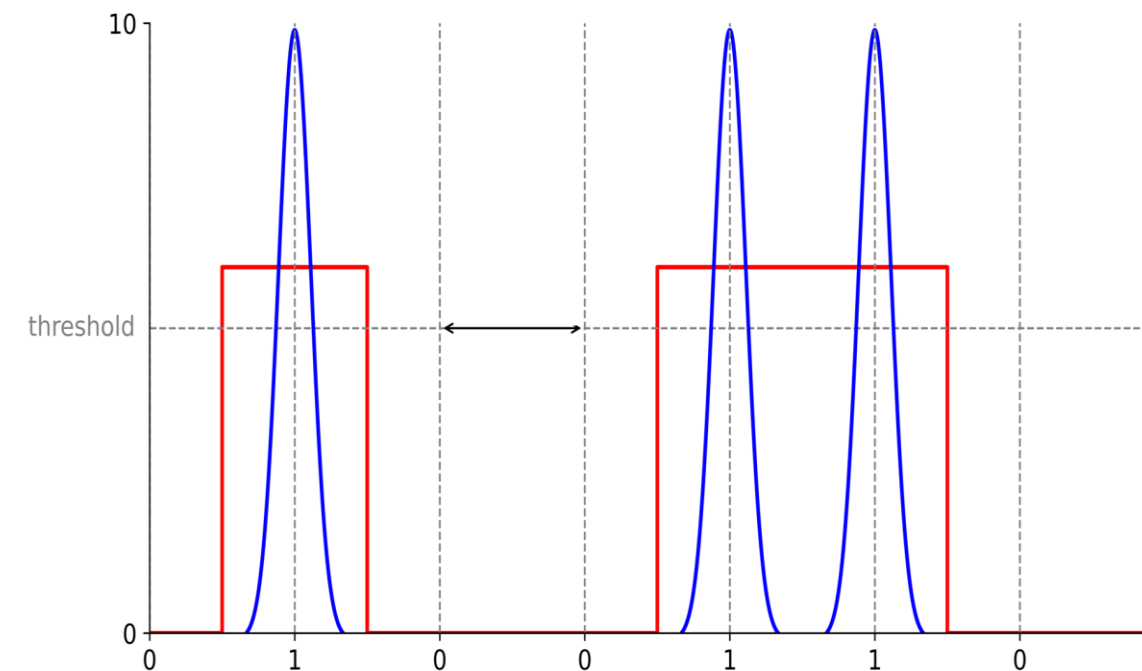


SI of the BL and NLL when $\Delta T = 310^\circ\text{C}$.

J. Chen *et al.*, "Free-space transmission system in a tunable simulated atmospheric turbulence channel using a high-repetition-rate broadband fiber laser," *Appl. Opt.* **58**(10), 2635-2640 (2019). DOI: 10.1364/AO.58.002635.

X. Zhang *et al.*, "Scintillation index reducing based on wide-spectral mode-locking fiber laser carriers in a simulated atmospheric turbulent channel," *Opt. Lett.* **43**(14), 3421-3424 (2018).

High peak power, short pulse — reduced duty cycle



Example of optical signal with different carrier **pulsed laser** and **continuous-wave laser** with the same average power

OUR APPROACH

Integrated photonics for compact FSOC terminals

Today's ultrafast-laser FSOC terminals rely on bench-top lasers, discrete amplifiers, and free-space optics — proven in the field, but bulky.

FYLA Networks is developing an integrated-photonics transceiver that folds the laser source in a fraction of the size, weight, and power of a bench-top terminal.

