cailabs
SHAPING THE LIGHT

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EPIC RoundTable OPTRO 2024

Jean-Pierre Gautier– Business Development Manager

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Cailabs: who are we?
A deeptech expert in laser shape manipulation

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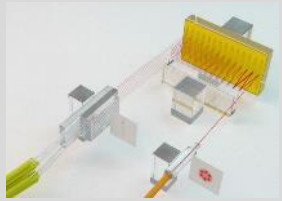
MPLC tech spun-out from University



- MPLC tech derived from decades of quantum optics at **Kastler Brossel Lab**
- New class of beam transforms based on sequence of **spatial phase profiles**
- **Passive** with **no intrinsic loss** and **no moving parts**

And turned into innovative products

CANUNDA BY CAILABS

3D print faster and laser-weld copper for car batteries

AROONA BY CAILABS

Save on local networks upgrades, both cash & CO_2

PROTEUS BY CAILABS

Explore new possibilities for the future of fiber networks

TILBA BY CAILABS

Deliver high-capacity FSOC even through the atmosphere

CUSTOM

Confidential & emerging solutions

Cailabs today

Created in **2013**

26+ patent families

90+ employees

46 M€ raised

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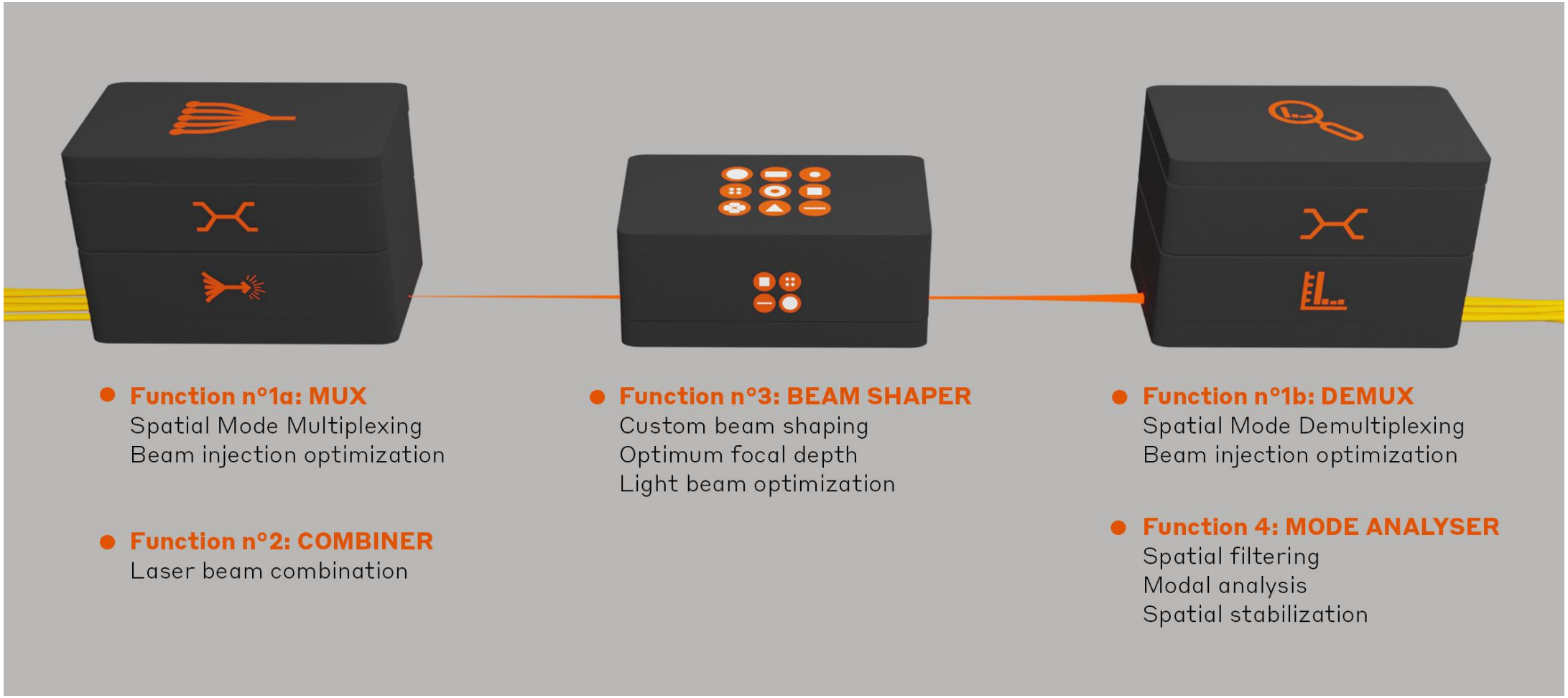
What are the Cailabs solutions?
Useful know-how and interesting technological building blocks



- **Function n°1a: MUX**
  Spatial Mode Multiplexing
  Beam injection optimization
- **Function n°2: COMBINER**
  Laser beam combination
- **Function n°3: BEAM SHAPER**
  Custom beam shaping
  Optimum focal depth
  Light beam optimization
- **Function n°1b: DEMUX**
  Spatial Mode Demultiplexing
  Beam injection optimization
- **Function 4: MODE ANALYSER**
  Spatial filtering
  Modal analysis
  Spatial stabilization

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Cailabs value proposition

Beam combination, Beam shaping, Mode analyzer and SDM

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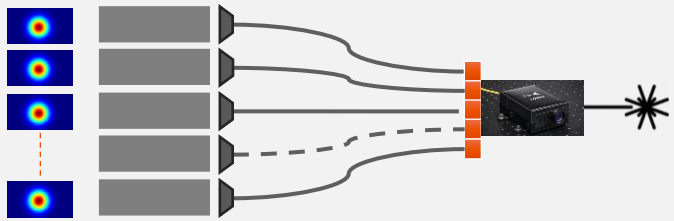
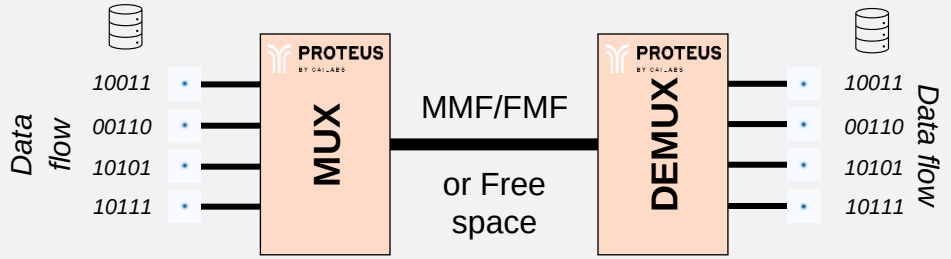
BEAM COMBINATION

Coherently with phase locker or incoherently
1µm – 1,5µm – 2µm – 4µm



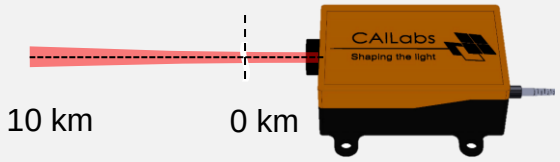
MUX/DEMUX

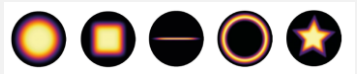
Space Division Multiplexing
C+L Band



BEAM SHAPING

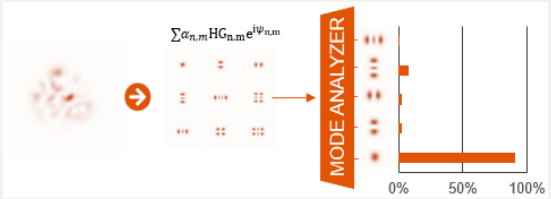
A few cm – several km
VIS to MIR





MODE ANALYZER

Modal analysis of a laser beam
1µm – Cband – 2µm - MIR



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Cailabs applications for Defense market

Directional Infrared Counter Measures :

- Increasing the transmission power of the systems and specific shaping of the transmission signal

Directed Energy Weapon:

- Increasing the transmission power of the systems and specific shaping of the transmission signal

Rangefinder/LiDAR:

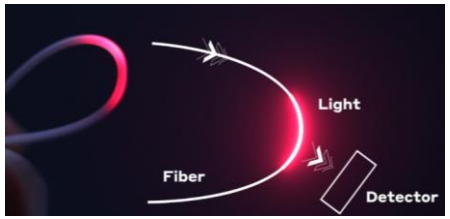
- Increasing the transmission power of the systems and specific shaping of the transmission signal

Fiber Optic Rotory Join:

- Significantly increase the bandwidth in a fibre transmission

Cybersecurity:

- Cyber physical protection for optical fiber
- Quantum Key Distribution with OAM modal basis



	MUX DEMUX	COMBINER	BEAM SHAPER	MODE ANALYZER
DIRCM		●	●	
DEW		●	●	
LiDAR		●	●	●
FORJ	●			
CYBER	●			
OGS		●	●	●

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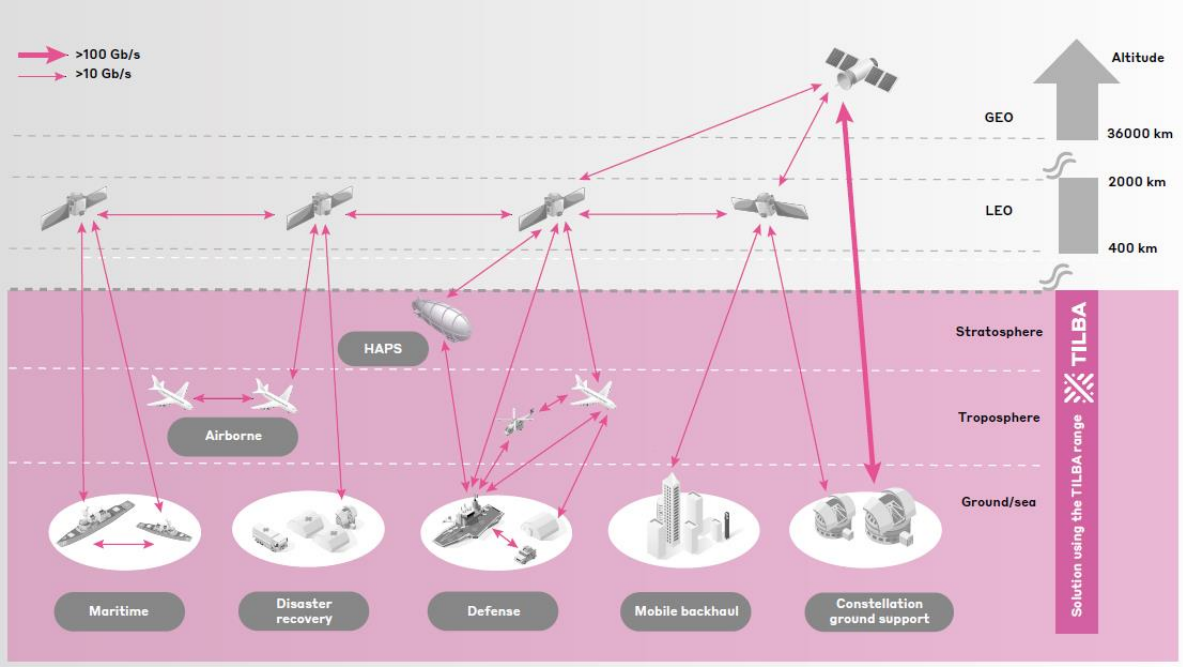
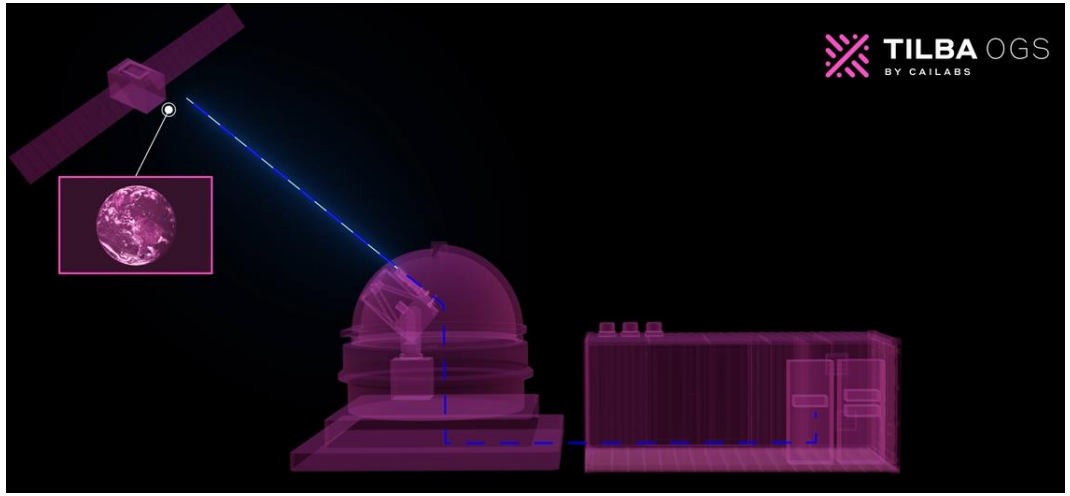
Cailabs : Defence and communication

Laser COM : Optical Ground Station:

- Maximize the link budget for transmission and reception





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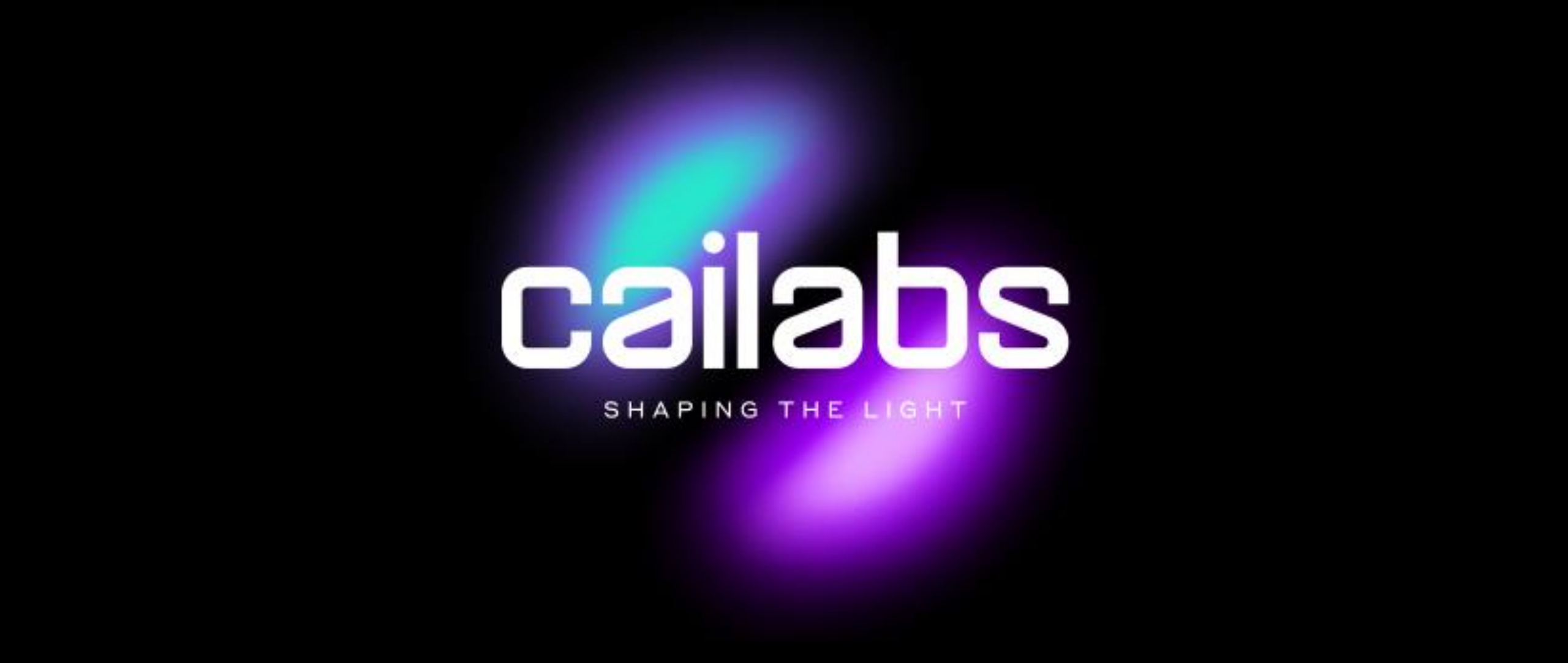

Thank you for your attention!

Jean-pierre@cailabs.com

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