exail

SOLUTIONS FOR QUANTUM TECHNOLOGIES

Exail, a European leader in photonics and quantum technologies

Exail is a leading high-tech industrial champion specializing in cutting-edge photonics technologies. The company helps engineers all around the world to get the most out of light by providing high performance, innovative and reliable photonics solutions for high speed communications, fibers-based sensors, space, science, medical, and quantum technologies.

From design to manufacturing, Exail masters the complete production chain of specialty fibers, bragg gratings, high speed modulation solutions and micro-optics assemblies. With a portfolio including the flagship absolute quantum gravimeter, Exail is a pioneer in the field of quantum sensing.

Beyond quantum sensors, Exail's photonics solutions enable mature applications to be developed in the fields of Quantum Communication, Quantum Simulation and Quantum computing, both for academic laboratories and for industry. The development of dedicated intelligent frequency-stabilized laser systems, integrated micro-optics benches and other dedicated optical components and sub-systems holds the key to such success. These state-of-the-art technologies for atom manipulation and atom cooling/trapping are now available for a broader range of users, including non specialists.

exail at a glance

80
YEARS OF EXPERIENCE

250+
MILLION EUROS OF TURNOVER

80%
OF TURNOVER ACHIEVED ABROAD

1500+
EMPLOYEES

30+
ONGOING PATENTS

20%
OF TURNOVER REINVESTED EACH YEAR IN R&D

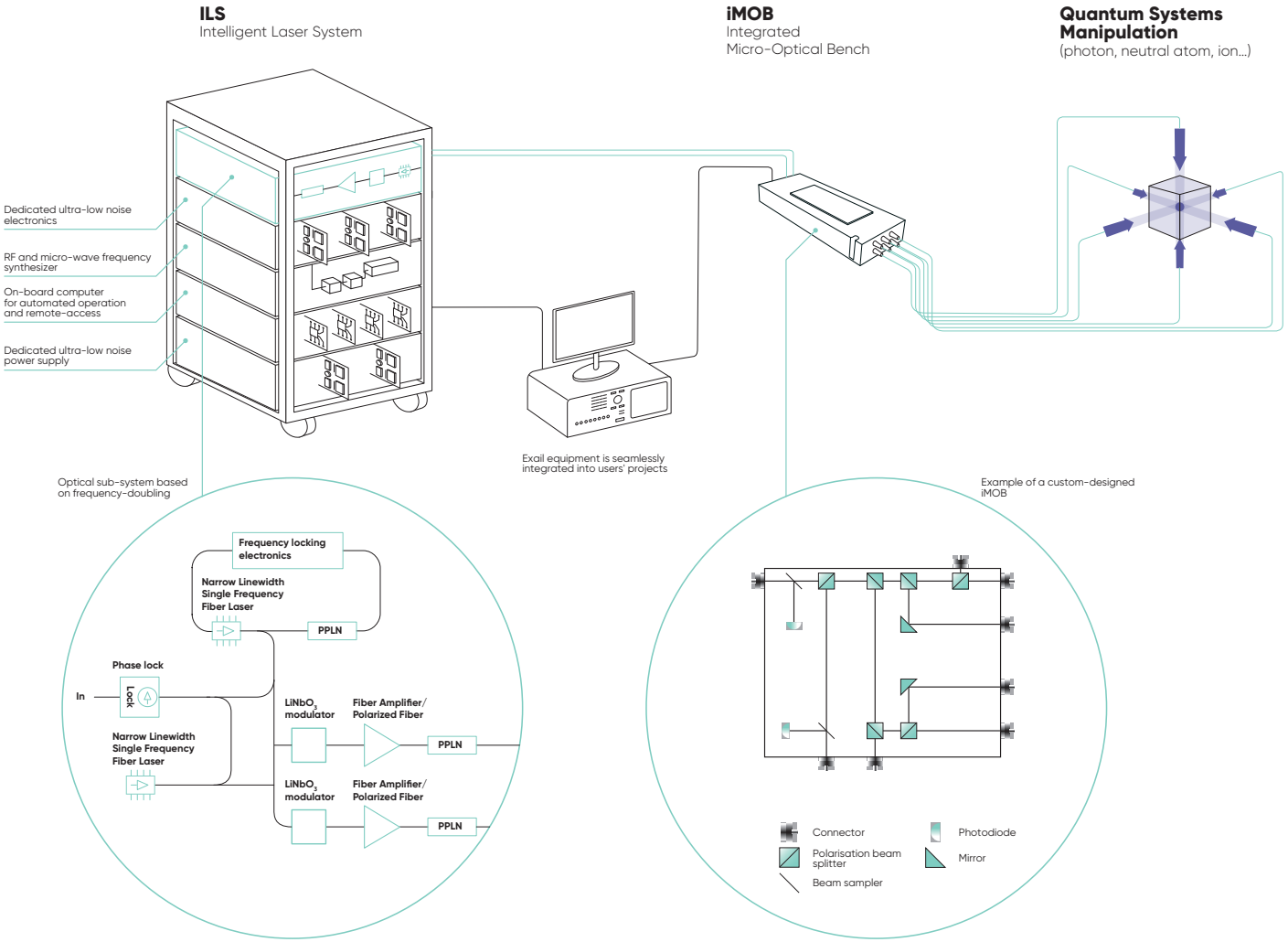
6500+
KM OF FIBER LINKS OPERATED FOR OPTICAL CLOCK DISSEMINATION

15+
QUANTUM GRAVIMETERS OPERATING WORLDWIDE

100+
LASER SYSTEMS DELIVERED FOR COLD-ATOM TECHNOLOGIES

QUANTUM SYSTEMS MANIPULATION: FROM COMPONENTS TO LASER SYSTEMS

At the heart of the success of Exail's solutions for quantum technologies, there is the Intelligent Laser System (ILS). It integrates a range of in-house components and sub-systems (iMOB), offering innovative and reliable solutions for the most challenging quantum technology platforms.



MASTERING A COMPLETE VALUE CHAIN FOR QUANTUM TECHNOLOGIES

Exail's optical components, sub-systems and integrated lasers enable to develop mature applications in the fields of quantum sensing, quantum communication, quantum computing and quantum simulation.

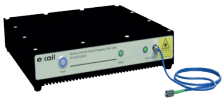
Laser systems

Intelligent Laser systems (ILS) Series

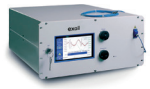
ILS

Integrated laser

Ultra-Stable Master Laser (USML) Series



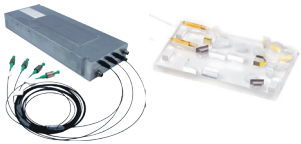
Narrow linewidth single frequency fiber laser



USML

Sub-systems

iMOB Series and modulator unit



iMOB

ModBox

Components

Fibers, modulation solutions

Doped and polarizing optical fibers

$LiNbO_3$ and PPLN

Hybrid coherent demodulator

FIELD-PROVEN SOLUTIONS COVERING A WIDE RANGE OF QUANTUM APPLICATIONS, FROM THE DEEP SEA TO OUTER SPACE

A flagship instrument for Quantum Sensing

The Quantum Sensors division of Exail (formerly Muquans), founded in 2011 in the very footsteps of Alain Aspect, was the first company to commercialize quantum sensors based on laser-cooled atoms for field applications. Exail's Absolute Quantum Gravimeters are now operated worldwide by non-specialists, from the top of Mount Etna to Antarctica. They rely on atom interferometry with laser-cooled Rubidium atom and feature a state-of-the-art measurement performance at the level of 10^{-9} g stable over years.

Exail's developments now benefit the area of Quantum Sensing: Field-proven solutions covering a wide range of quantum applications, from the deep sea to outer space are commercially available to precisely control and convey the frequency, phase and amplitude of laser light regardless of the environment.

Towards Quantum Inertial Navigation

Exail's R&D teams nurture fruitful collaborations with leading research labs. The iXAtom joint laboratory brings together Exail and researchers from the Laboratoire Photonique Numérique & Nanosciences - LP2N lab (CNRS / Institut d'Optique Graduate School / Université de Bordeaux) to develop quantum technologies for high end Inertial Sensors.

The iXAtom research team has realized the first 3-axis quantum inertial sensor that allows to continuously measure the acceleration in 3 dimensions and for any orientation of the sensor. This is an important step towards the development of a drift-free inertial navigation system exploiting the quantum advantage.

Exail's Absolute Quantum Gravimeter performed the world's first detection of gravity changes induced by volcanic processes (at a level of 10^{-8} m/s^2)

The 3-axis quantum inertial sensor developed by iXAtom joint laboratory is an important step towards drift-free navigation systems.

Reliable components and systems for Quantum Communication

A key topic of quantum technologies regards the ability to share quantum information between distinct parties - either locally or remotely - for which Exail's photonics solution provides strong technological advantage.

Enabling long-distance quantum communication, quantum repeaters are being developed using Exail's Intelligent Laser Systems and integrated Micro-optical Benches (iMOBs) for reliable field-compatible entanglement distribution.

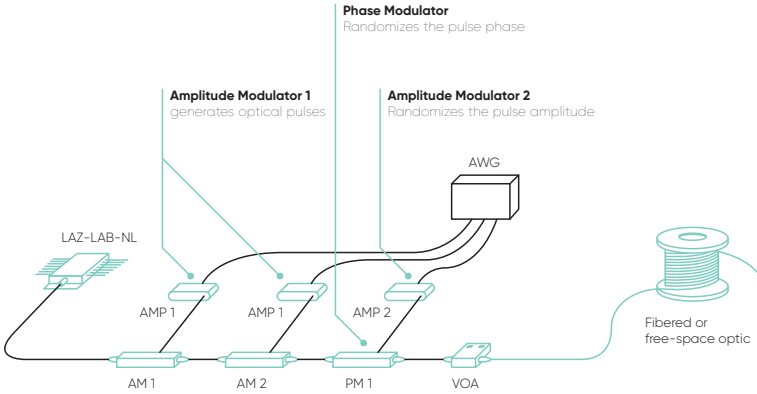
Exail is also a key player in the field of Quantum Key Distribution (QKD), and more specifically continuous-Variable QKD (CV-QKD). The company $LiNbO_3$ Modulators and their matching components dedicated to the communication transmitter side (Alice) and the COH 90° optical hybrids demodulators enable to extract phase, amplitude and polarization on the receiver side (Bob).

Ensuring faster developments in Quantum Computing and Simulation

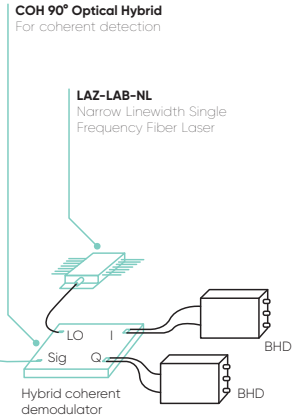
Efforts deployed by academic laboratories and companies worldwide to develop quantum processors are tremendous. Exail's innovative and reliable photonics components and systems are there to ensure faster development, from fundamental research to commercially available machines, and allows increasingly complex set-ups to be developed and run.

Whether you rely on photons, neutral atoms, trapped ions, NV-centers to implement quantum computing or quantum simulation, our iMOBs and modulation solutions will help reach the most ambitious goals.

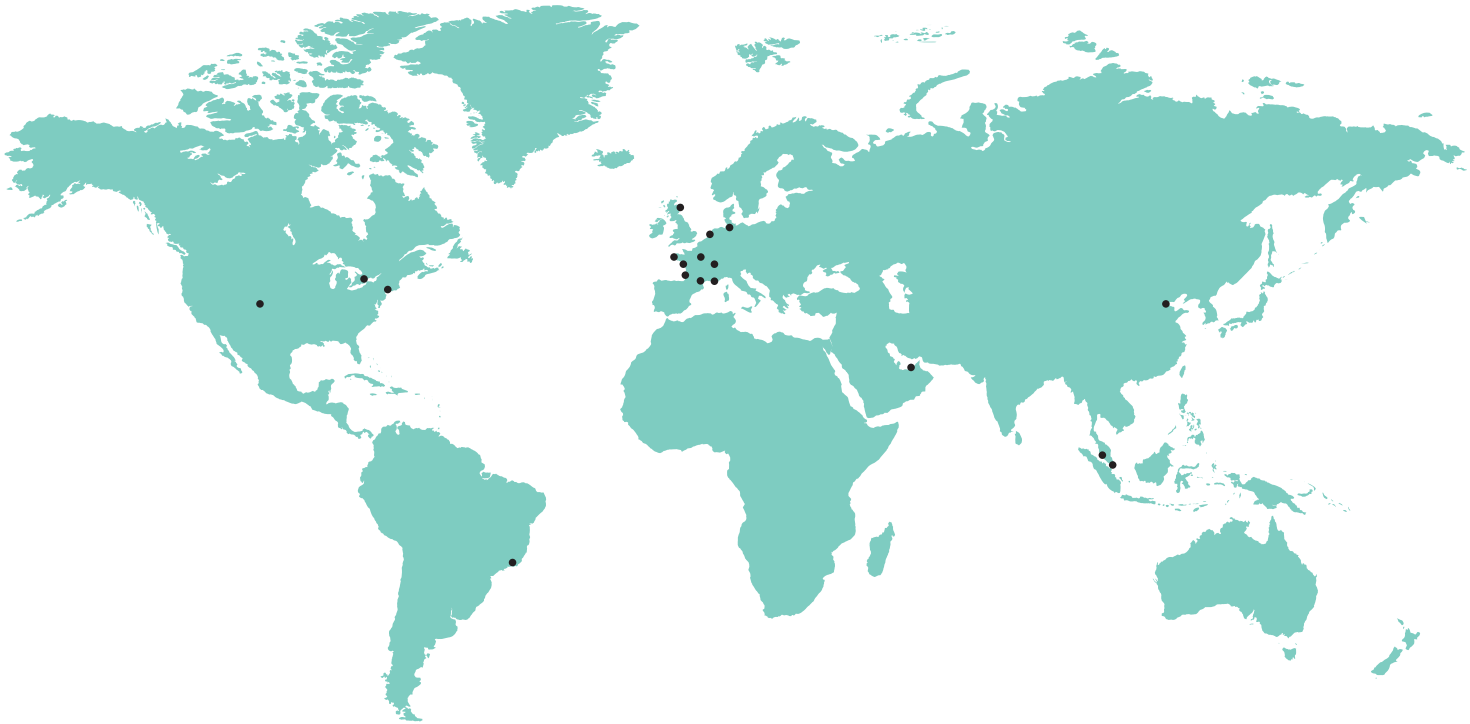
Emitter (Alice)



Receiver (Bob)



Exail provides reliable components (modulators, VOA, COH) and sub-systems (LAZ-LAB-NL) to implement CV-QKD, both for the transmitter side and the receiver side.



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