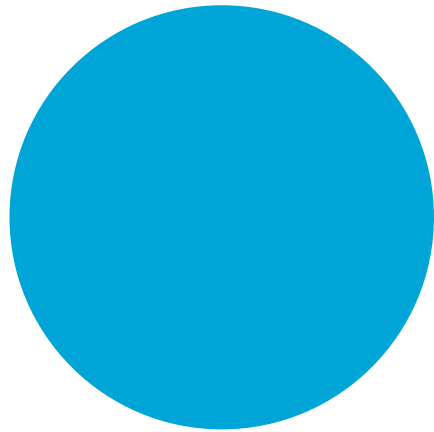


iXblue



Detecting volcano eruptions with a cold-atom quantum gravimeter on the summit of Mount Etna

Dr. Jean Lautier-Gaud

Who we are?

WHO
WE
ARE

world's leading provider of integrated quantum solutions

OUR
GOAL

To provide the benefits of Quantum Technologies to non-experts through turn-key Quantum Sensing and advanced laser solutions.

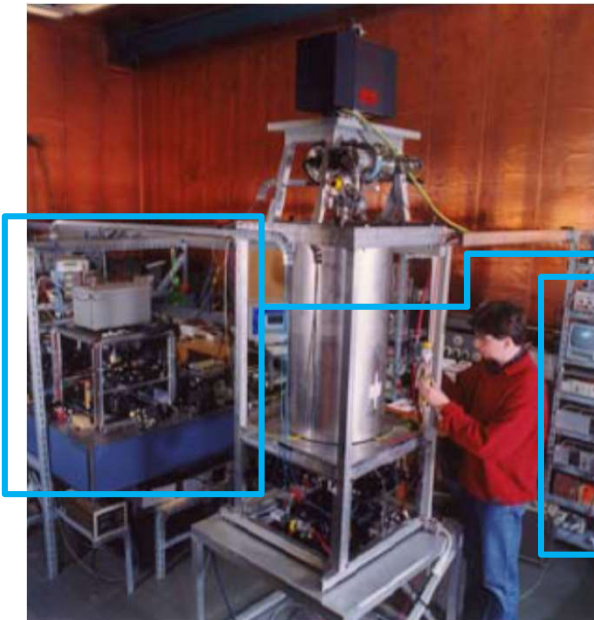
OUR
SALES

**AQG: 19 devices sold
100+ metrology-grade turn-key solutions for Quantum Technologies**

Our why

OUR
WHY

Make cold atom devices and technology turn-key and reliable on the long-term



Cs Fountain at PTB, Braunschweig



Light-pulse atom interferometry using cold Rb atoms

Newton-g: the project

Quantum Sensing to monitor natural hazards

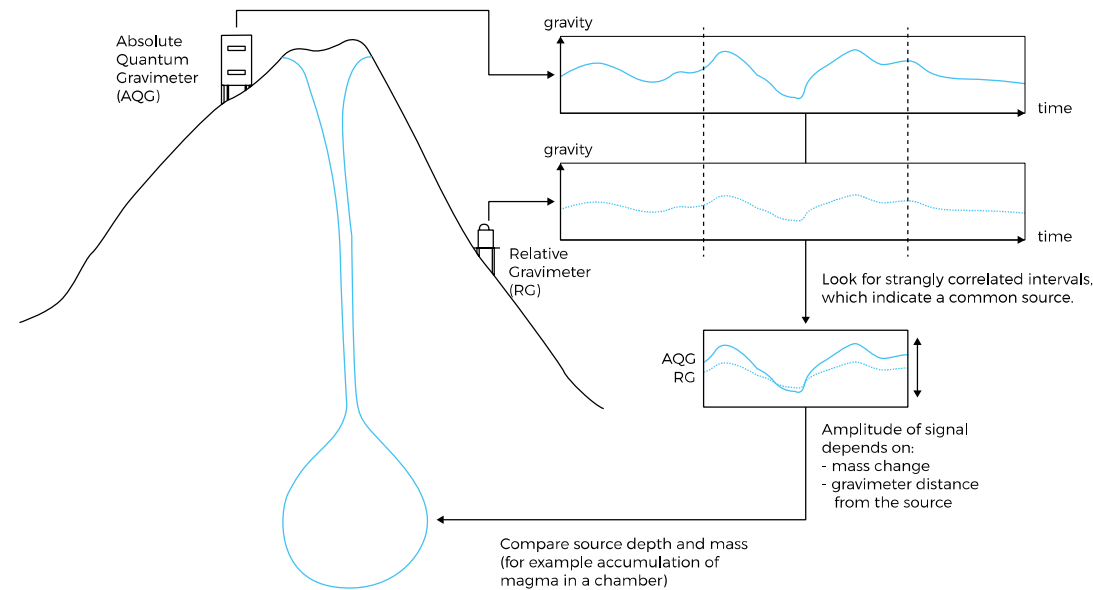
NEWTON-g



Funded under H2020



- Gravimeter: measurement of $g \sim 9.81 \text{ m/s}^2$ directly sensitive to underground bulk masses
- Monitor magma displacement in the sub-surface to anticipate volcano eruptions



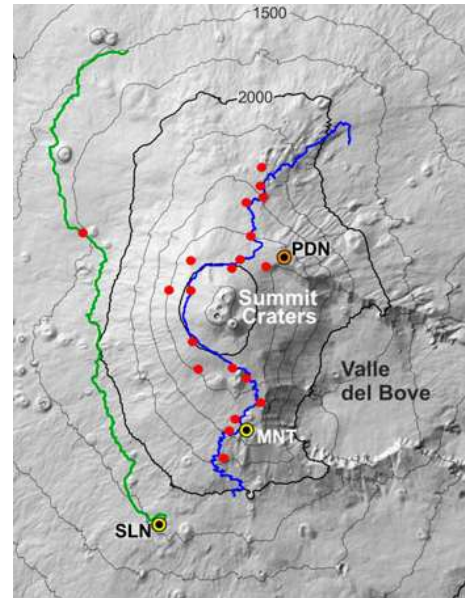
Newton-g: the deployment

Deploying a cold-atom based gravimeter on a volcano

NEWTON-g



Funded under H2020



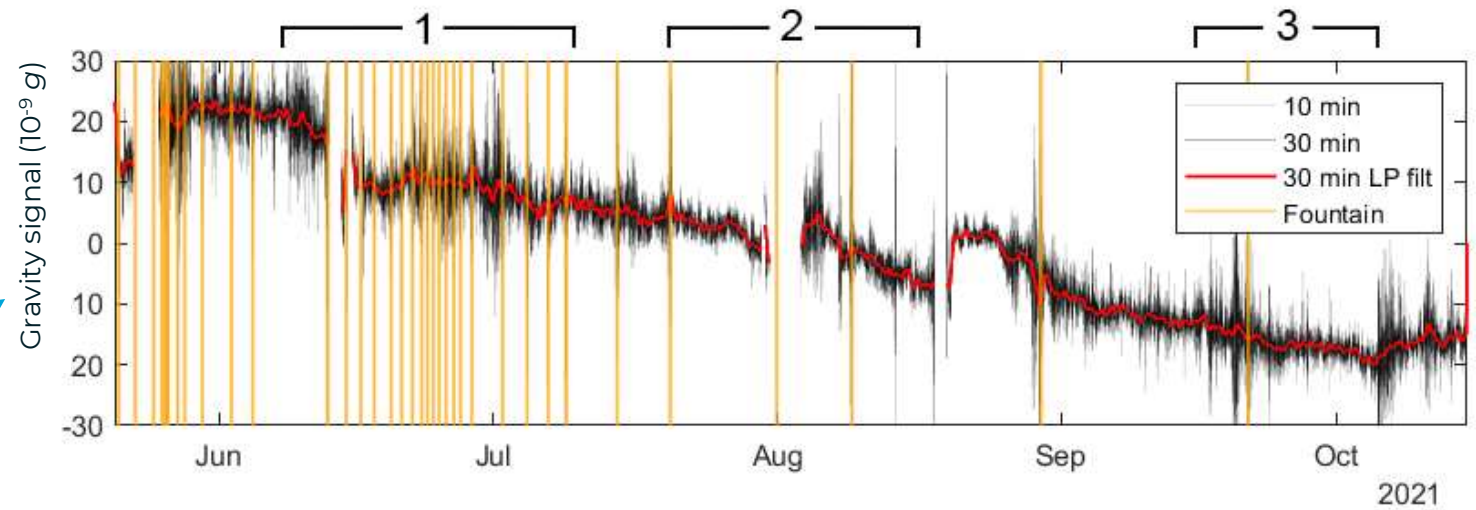
- Installed end July 2020 on North-East crater:
2800m altitude
- Off-grid power supply
Solar panels + batteries + diesel generator
- Challenging conditions
Temperature changes [-5°C ; 20 °C]
Uneasy access (snow in winter)
Instabilities in power supply

Newton-g: the results

Deploying a cold-atom based gravimeter on a volcano

NEWTON-g

Funded under H2020



L. Antoni-Micollier et al., « **Detecting volcano-related underground mass changes with a quantum gravimeter** », submitted and under review

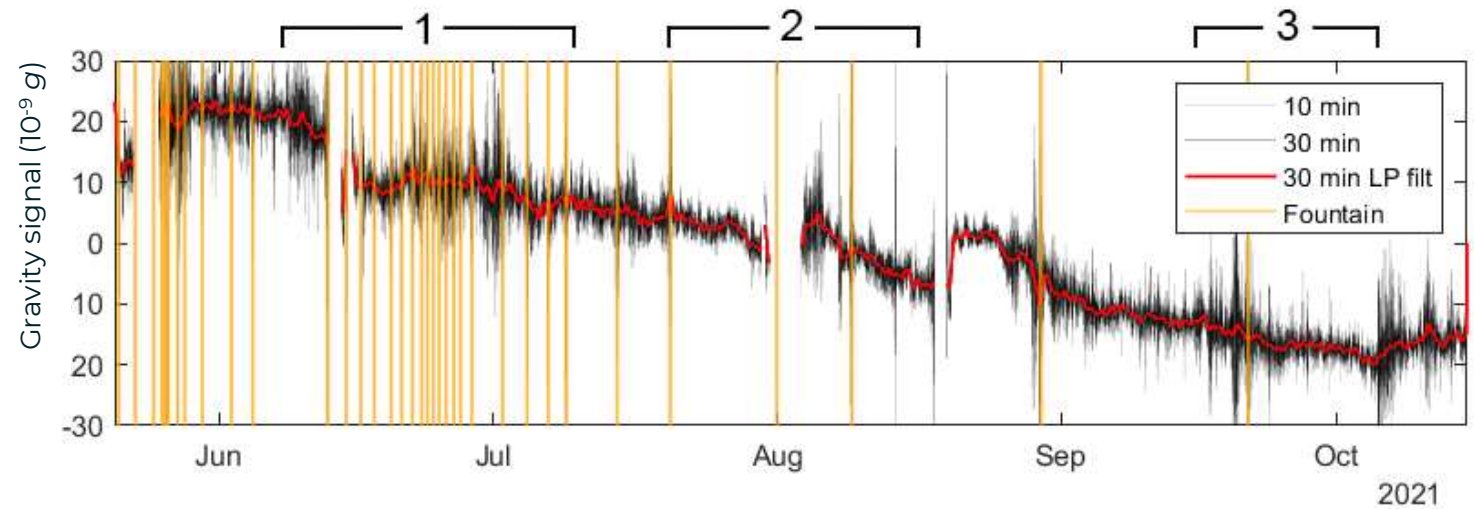
Newton-g: the results

Deploying a cold-atom based gravimeter on a volcano

NEWTON-g



Funded under H2020



- Continuous drift-free measurement without any human attendance for almost 2 years
- Remote-accessed equipment
- Quantum Sensor based on iXblue's photonics solutions deployed for real world applications

Ultimate demonstration of iXblue's cold atom & Photonics technologies

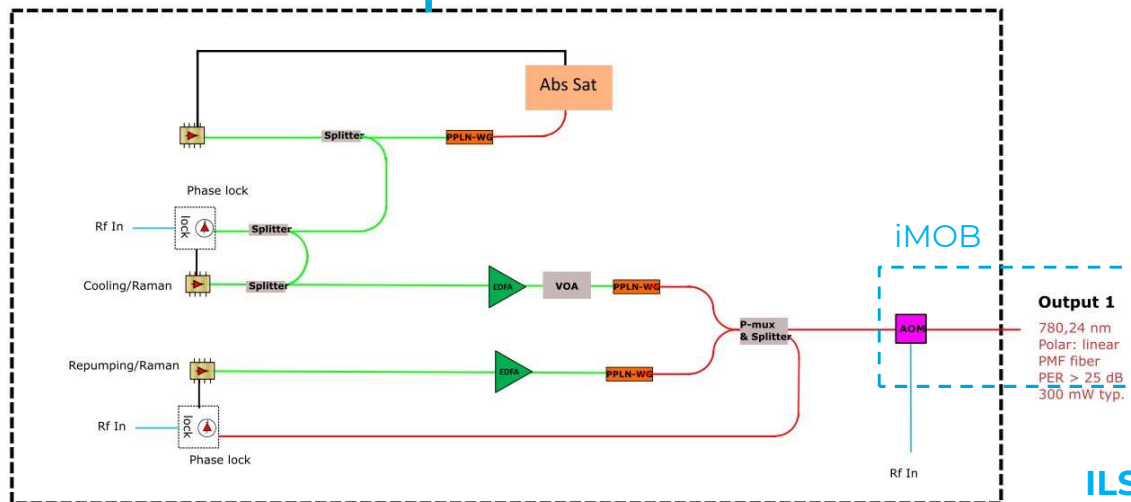
Newton-g: take-home messages

The ultimate proof of iXblue's Photonics performance and reliability



- Cold Rubidium atom technology are mature (TRL 9 for ground use)
- Completely autonomous, turnkey and remote controlled instrument on Mount Etna since 2020

Enabled by iXblue's ILS lasers and complementary Photonics solutions



ILS laser series

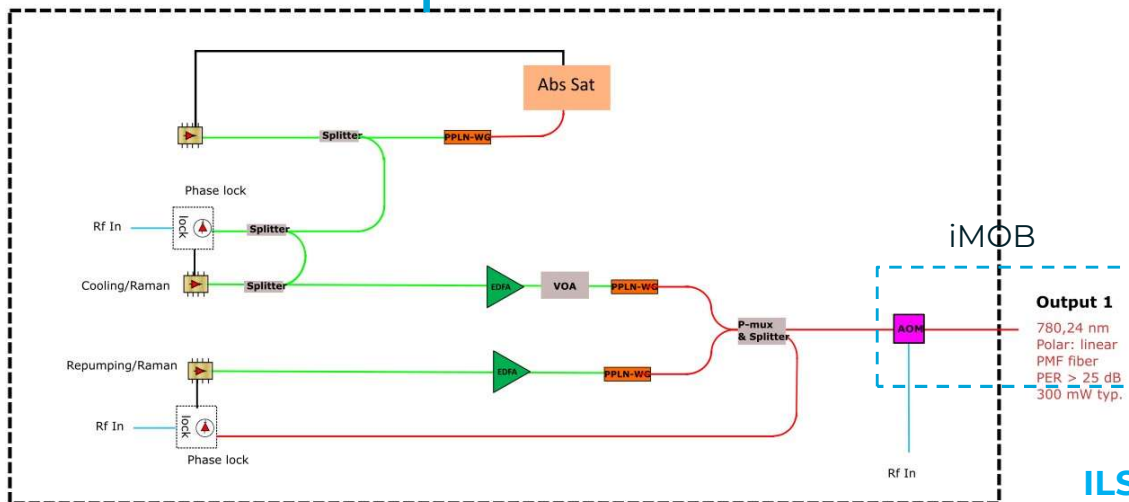
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ILS laser series

iXblue Photonics for Quantum Technologies

Navigating the supply chain of Quantum Technologies

Quantum Sensing

Quantum Communication

Quantum Simulation

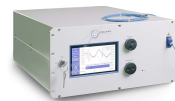
Quantum Computing

Systems



ILS laser series
Intelligent Laser systems

Sub-systems



USML laser series
Ultra-stable Master lasers

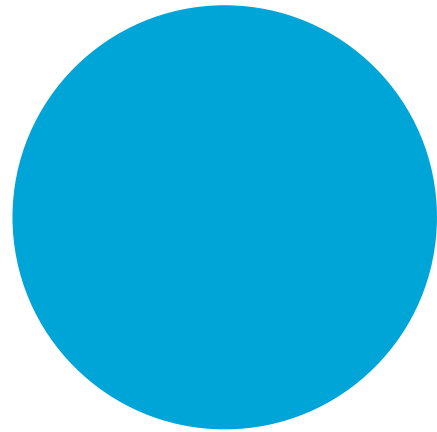
Components



iMOB series
Integrated Micro-Optical Benches



Fibers, modulation solutions



**Questions?
Fragen?**