

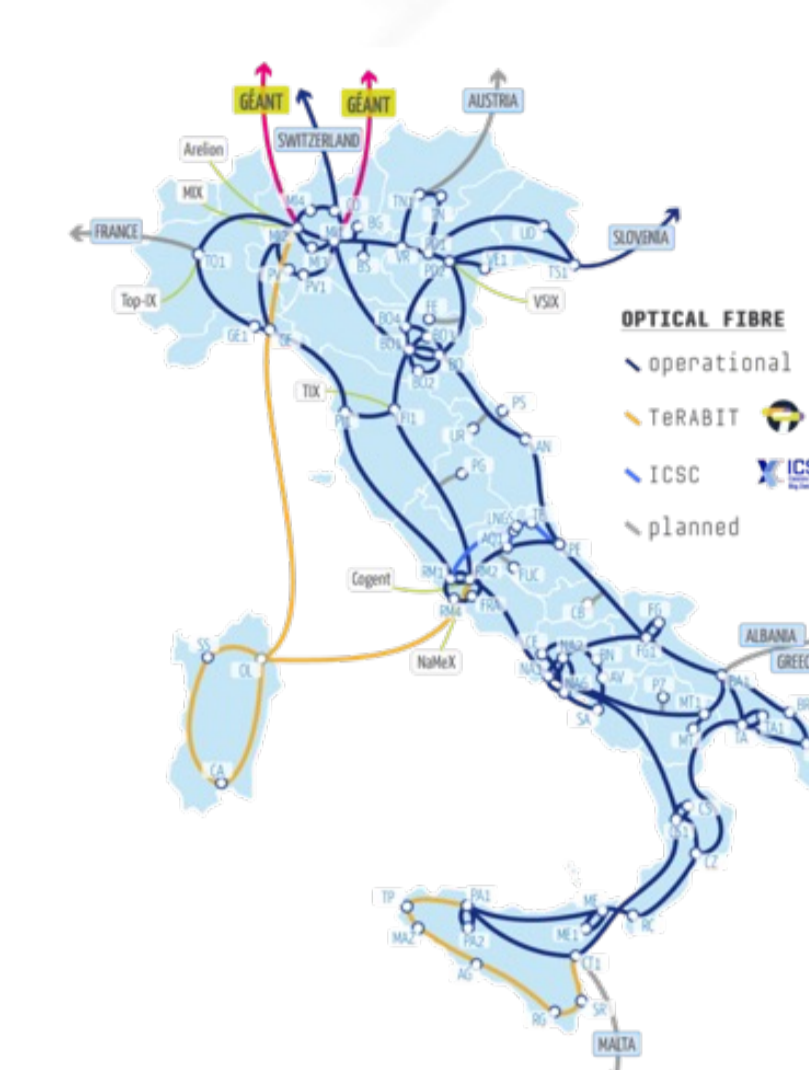
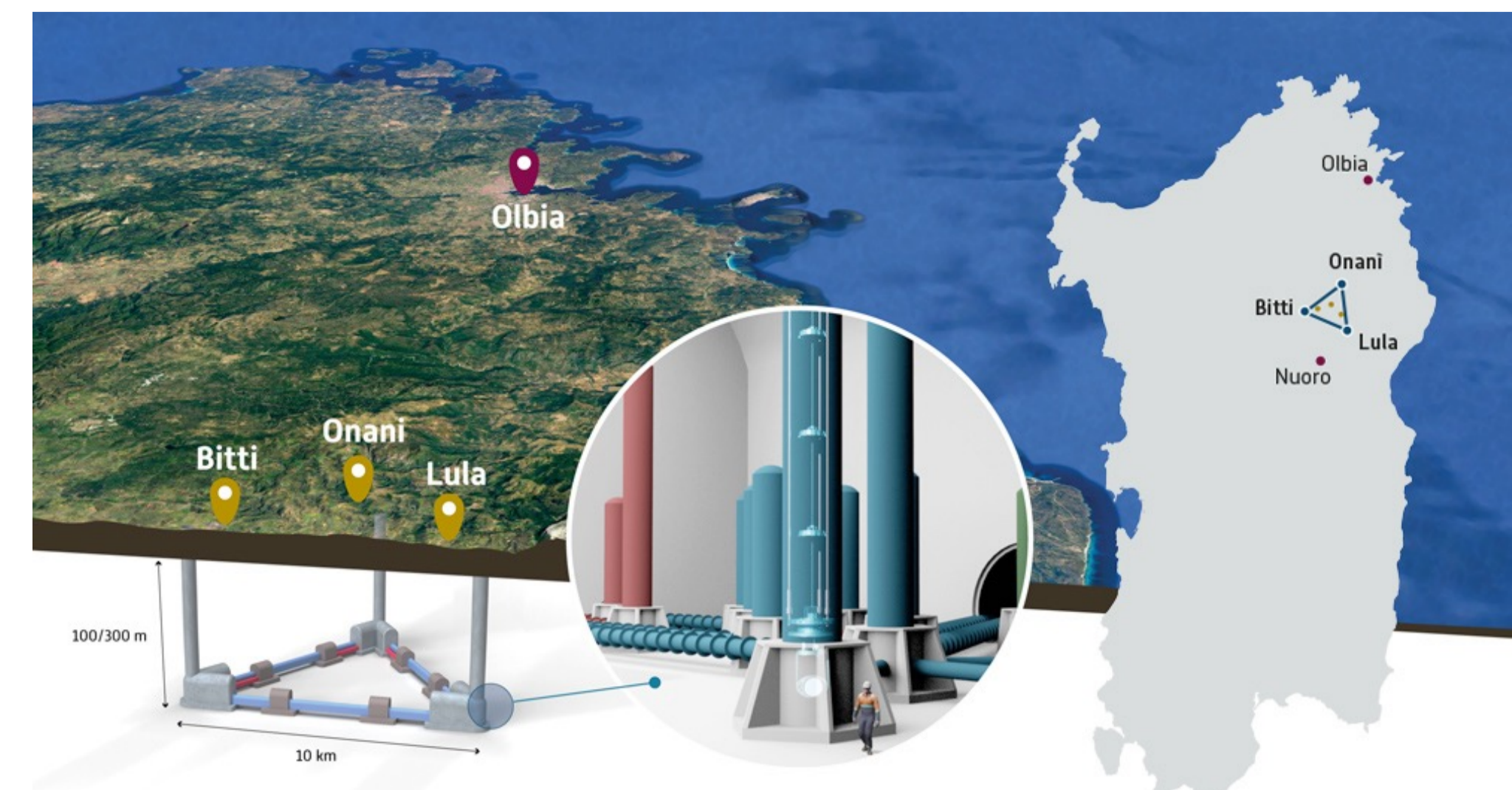
Angelo Loi<sup>1</sup>, Alberto Masoni<sup>1</sup>, Alessandro Cardini<sup>1</sup>, Andrea Contu<sup>1</sup>, Andrea Lampis<sup>1</sup>, Davide Brundu<sup>1,2</sup>, Francesco Quochi<sup>1,2</sup>, Michele Saba<sup>1,2</sup>, Daniela Marongiu<sup>1,2</sup>

<sup>1</sup>INFN Cagliari, <sup>2</sup>Università degli Studi di Cagliari

## ETICo2 OVERVIEW

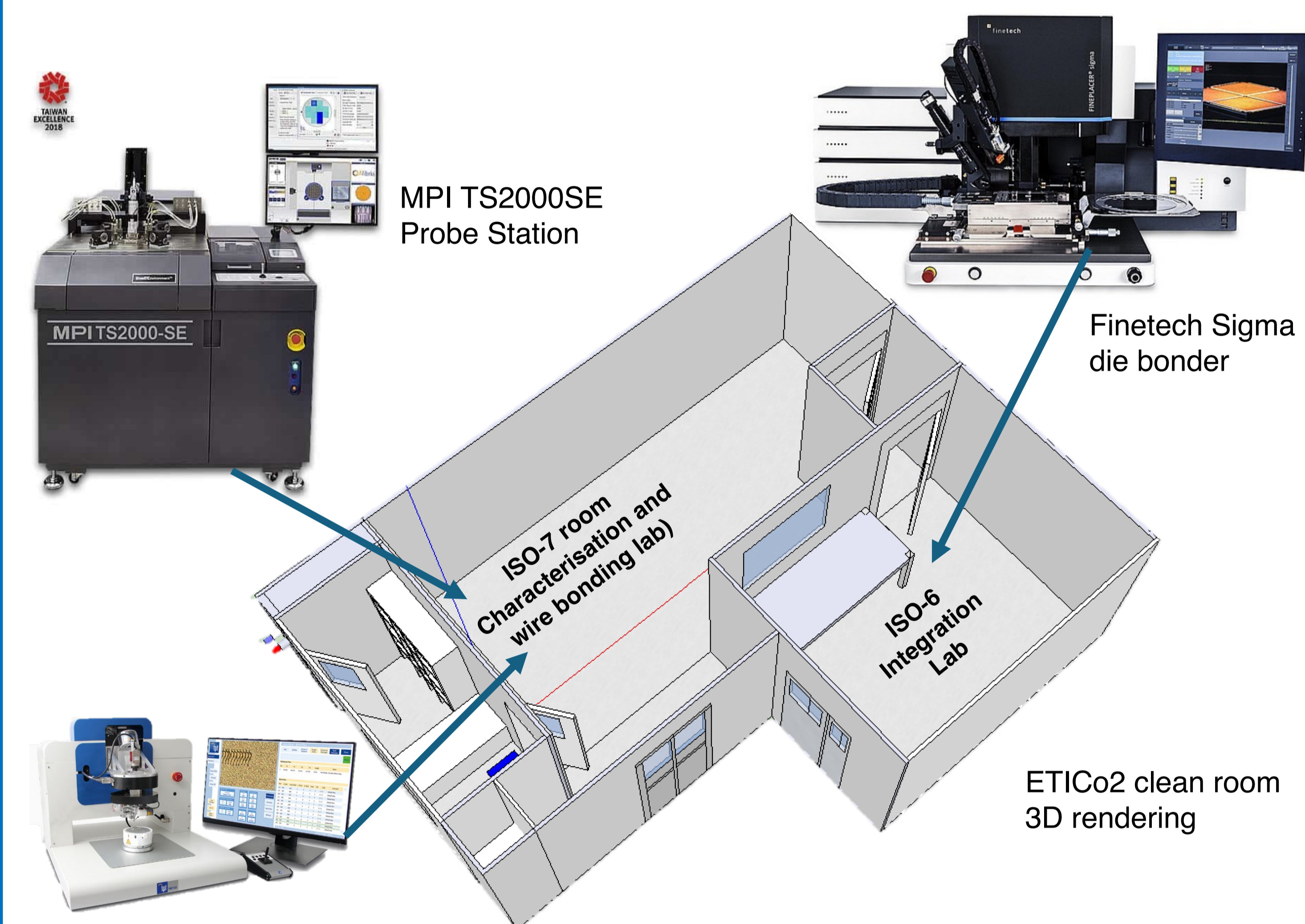
The Italian Einstein Telescope Infrastructure Consortium (ETIC) is an initiative led by INFN to establish a nationwide network of laboratories dedicated to advancing technologies and components crucial for the future Einstein Telescope gravitational wave interferometer, alongside a comprehensive characterization of the Sos Enattos site in Sardinia, Italy. ETIC will operate in synergy with the *TERABIT* project, which aims to integrate and enhance three strategic digital research assets: computing, network and distributed cloud-edge computing.

This poster provides an overview of ETiCo2 laboratories, currently in preparation in Cagliari both at the INFN and the Department of Physics of the University. These state-of-the-art facilities will be dedicated to the development, fabrication, and characterization of new opto-electronics devices essential for monitoring and controlling the future ET Interferometer. Additionally, the laboratories will undertake the design, manufacture, and testing of dielectric materials and multi-layer coatings, with a focus on structural, morphological, and thermo-optical properties crucial for enhancing mirror functionalities.



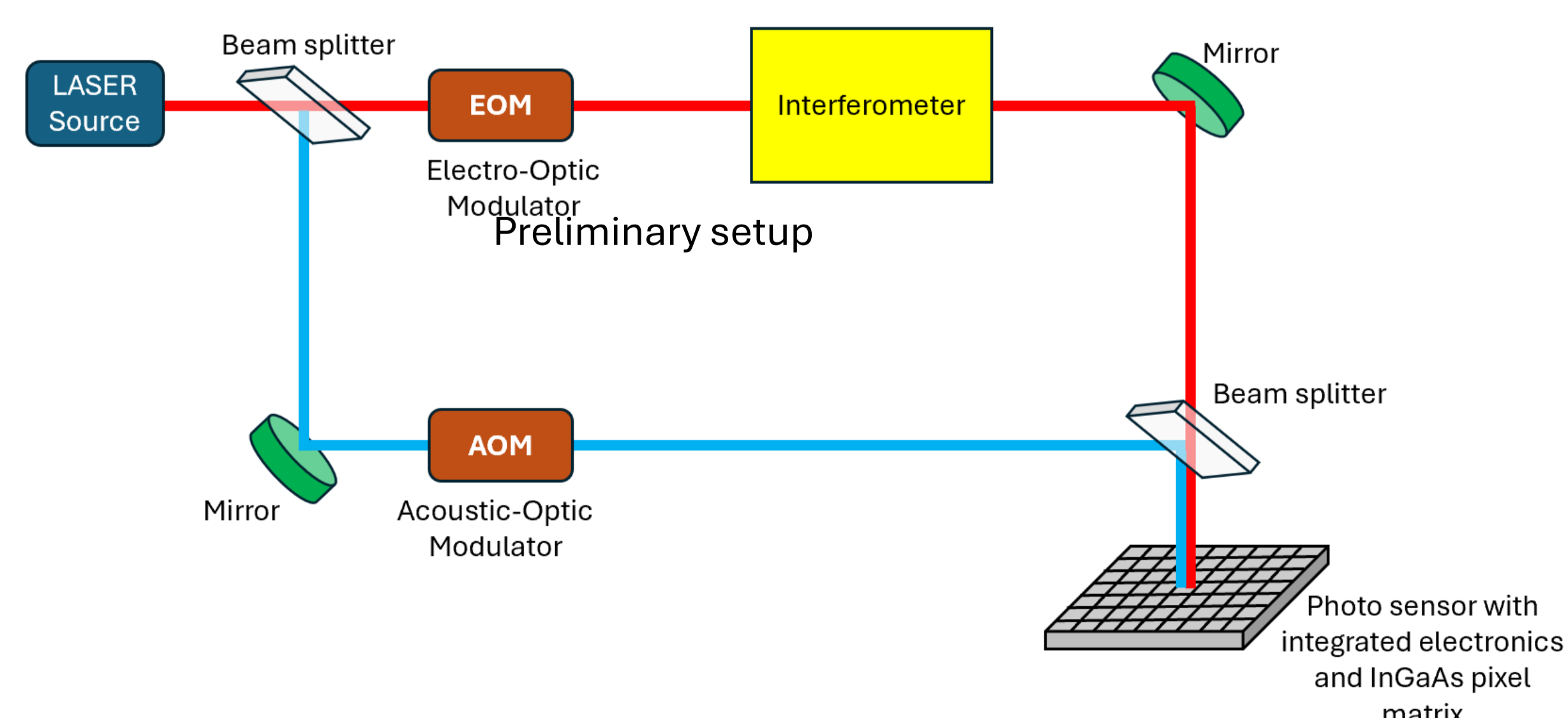
## ELECTRONICS

An advanced 40 m<sup>2</sup> cleanroom equipped with ISO7 and ISO6 environments is being set up to facilitate the development of innovative photodetectors. These detectors will be essential to monitor the overall status of the interferometer.



The lab will be equipped with state-of-the-art instrumentation for sensors and ASICs development and characterization, such as an 8" probe-station with thermal chuck and flip-chip die bonder.

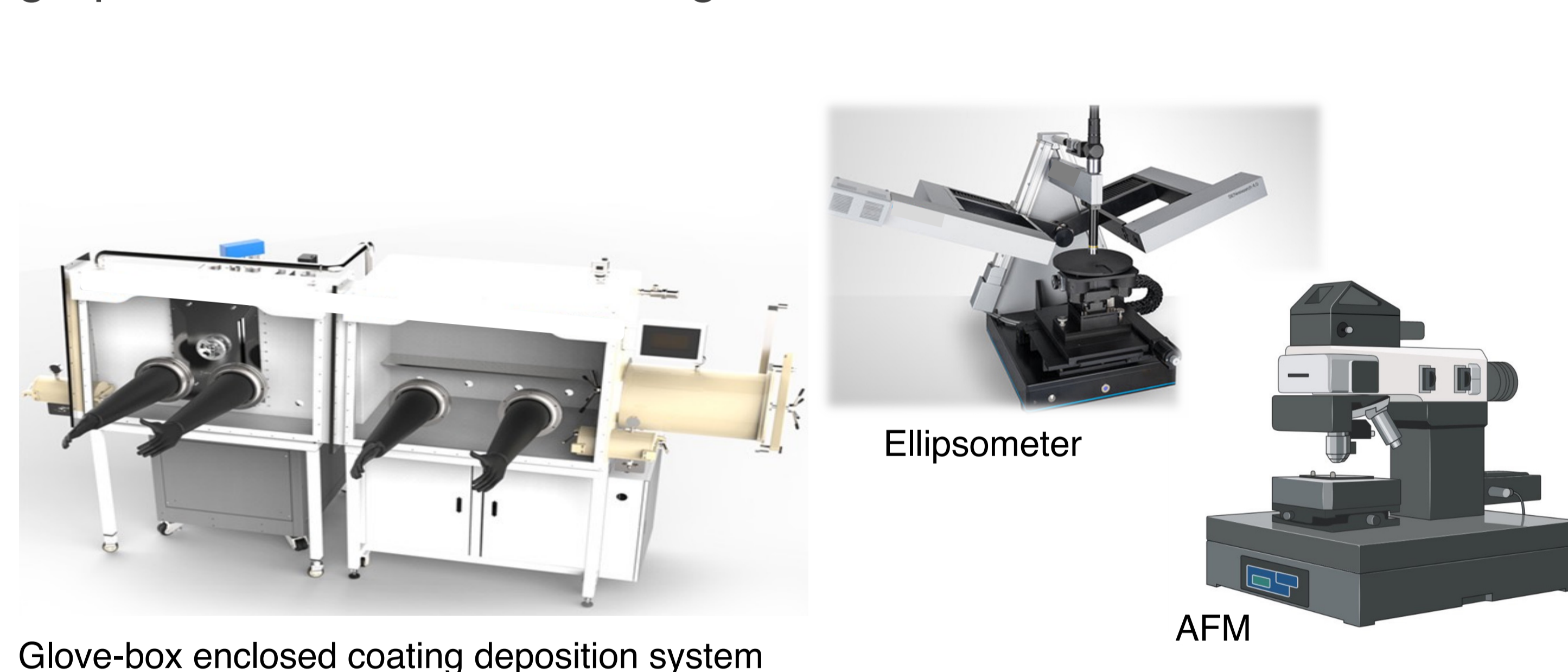
**Phase cameras** are a crucial part of the beam status monitoring system and its compensation system. These cameras measure the phases and amplitudes of the laser-light fields at the frequencies selected to control the interferometer and provide the feedback needed to perform corrections on lenses and mirrors.



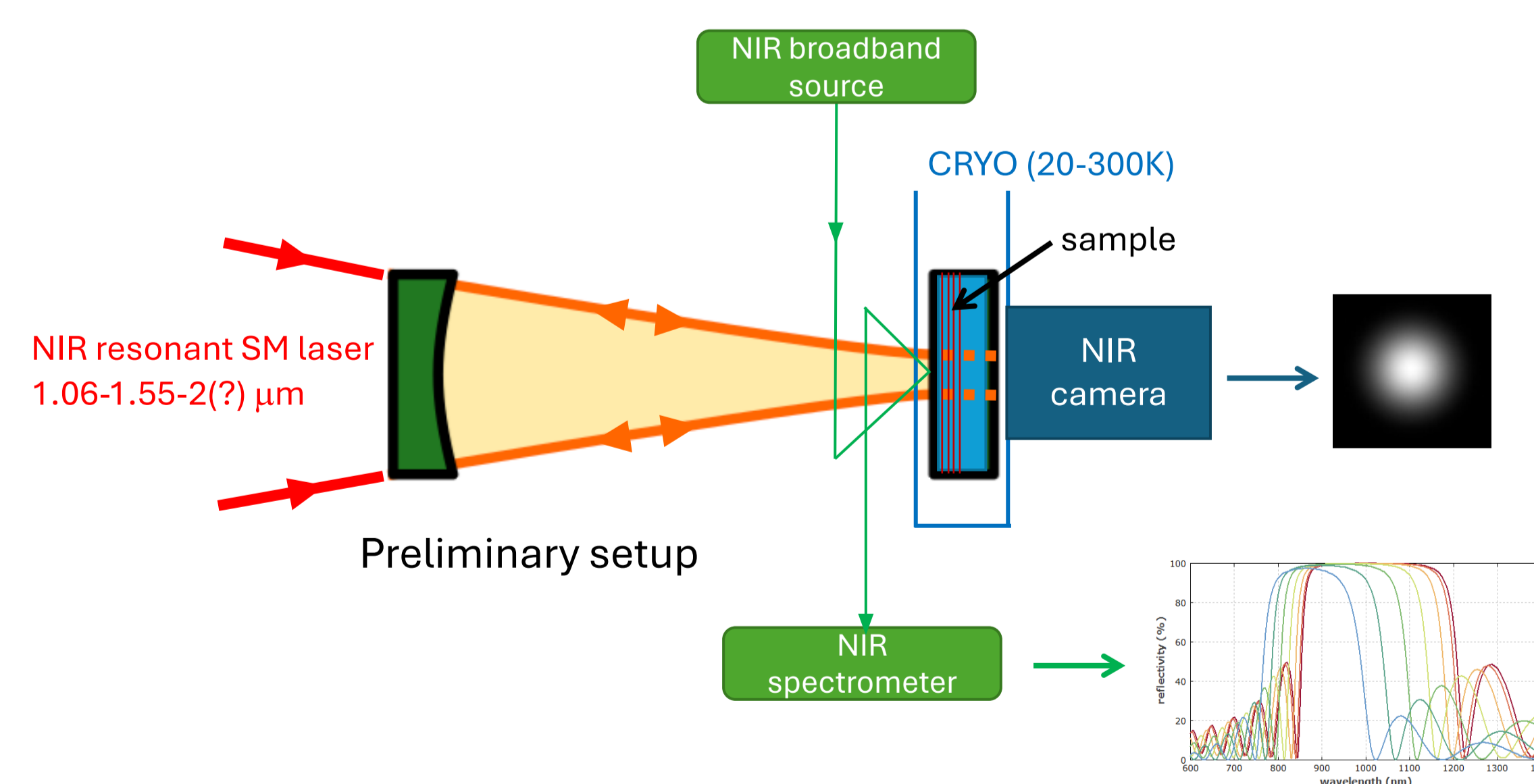
Within ETICo2, the opto-electronics effort is towards a new generation of phase cameras which potentially uses technologies developed within the LHCb Experiment at CERN such as multi-stacked electronics and pixel-matrix sensor.

## OPTICS

The ETICo2 optics laboratory will be equipped with all essential instruments for the design, development, fabrication, and characterization of thin films, specifically tailored for the production of high-performance mirror coatings.



In this fabrication laboratory, cutting-edge core instrumentation, including a state-of-the-art glove-box enclosed deposition system, atomic force microscope (AFM), and spectroscopic ellipsometer will be installed, together with a new optical table equipped with essential instrumentation for the comprehensive testing and evaluation of samples.



High-precision optical measurements:

- Cavity ring-down spectroscopy, photothermal deflection spectroscopy;
- Spectroscopic reflectance and ellipsometry.

## TIMELINE AND FUNDING

Lab rooms ready:	Sep 2024	Deployment:	end of 2025
Components acquired:	Jan 2025	Budget:	2.9 M€