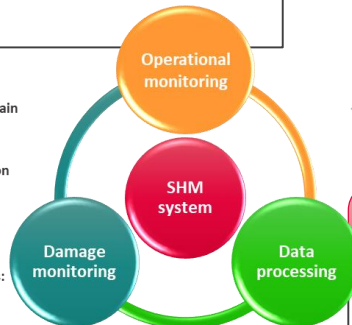## Technical skills and expertise / What we do

SHM = Damage and operational monitoring with data processing for diagnostic/decision

- Passive guided wave inspection for defect detection and characterization with low energy requirements and using optical fiber sensors (FBG, Rayleigh, Brillouin)
- Optical Fiber Sensing Technologies for both damage and operational monitoring
- Femtosecond Direct Writing of FBG/Rayleigh sensors for Extreme environment
- Optical interrogators using Photonic Integrated Circuits for embedded monitoring
- Simulation (CIVA) for sensor network optimization, performance demonstration and deep learning training
- Data processing based on physics and data (AI) for a robust diagnostic

→ **Towards enhanced structures, safer operations and predictive maintenance**

Optical fiber

Simulation
Relevant and uncertain parameters

Data Base Generation

Machine Learning

Automatic Diagnosis: Detection, Classification Characterization

Operational monitoring

SHM system

Damage monitoring

Data processing

Our platforms / Our means to do it

- Sachems: Regional platform to catalyze SHM R&D and enable quick prototyping-testing of integrated systems
- FiberLab: World-class facility dedicated to FBG-based and distributed sensing technologies; Sensors integration into materials (composite/metal/ceramic);
- CIVA: Worldwide leading software platform for NDT and SHM simulations
- Cislab: Instrumentation platform for metrological tests
- Gerim2: Regional platform of large NDT equipment

CIVA
N·D·E

SacHeMs

GERIM2
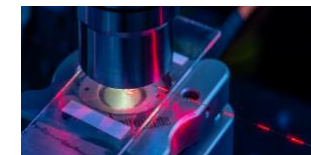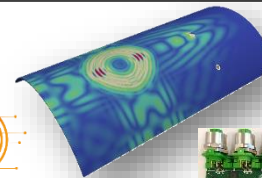
Potential applications of interest / What we want to do (non-exhaustive list)

- Monitoring of H2 tanks (early-damage detection, leaks, pressure measurement…)
- Monitoring of large or safety-critical structures, equipment and systems (aircraft fuselage, motors, pipeline, wind turbine blades…)
- Battery monitoring (internal parameter monitoring, state of charge, …)
- Standard and high temperature process monitoring
- Sensors integration into materials (additive manufacturing)

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CEA-List / Who we are

- CEA (France's Alternative Energies and Atomic Energy Commission) is a Research and Technology Organisation (RTO) and has been involved for more than 20 years in the sector of renewable energies as alternative to nuclear and fossil source.
- LIST Institute, part of CEA, is committed to technological innovation in digital systems. Its R&D activities - driven by major economic, societal and industrial challenges - encompass four main themes: factory of the future, cyber-physical systems, artificial intelligence and digital health.

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