Development of instruments
based on spectroscopic techniques for monitoring
systems and analysis of industrial processes

http://www.marwan-technology.com/

ARWAN
Technology

Collaborations

The enterprise was born after a long period of collaboration between the group and the high-technology industry, for advising and prototyping of measurement instruments

- **LIGO Project (NSF - CalTech - MIT)**
- **TAMA Project (Università di Tokyo)**
- **Agenzia Spaziale Italiana (ASI)**
- **Istituto Nazionale di Fisica Nucleare (INFN)**
- **Consiglio Nazionale delle Ricerche (CNR)**
- **Thales Alenia Space**

R&D

Marwan participates to several R&D projects at regional, national and European level; among these we mention:

- **Q-WEP** *(Atom Interferometry test of the Weak Equivalence Principle in space)*
- **STE-QUEST** *(Space Time Explorer and Quantum Equivalence Space Test)*
- **MED-SUV** *(MEDiterranean Supersite Volcanoes)*
- **ShredderSort** *Selective Recovery of Non-Ferrous Metal Automotive Shredder by Combined Electromagnetic Tensor Spectroscopy and Laser-Induced Plasma Spectroscopy*
- **ALMA** *(Laser Analysis of Precious Metals and Ambers)*
- **MONDI** *(MONitoring and DIagnostics of frescoes at the "Camposanto Monumentale" in Pisa)*

ARWAN Technology

Products & Services

Sensors and Instruments for Industry and Research

- Analytical Instrumentation
- Laser Sensors
- Laser Source
- Low-noise Electronics
- Laser Spectroscopy

ChemImage

LOTIS TII

ARWAN Technology

Analytical Instrumentation

AFS - Atomic Fluorescence Spectroscopy Instrumentation

Environmental Monitoring

ChemImage™

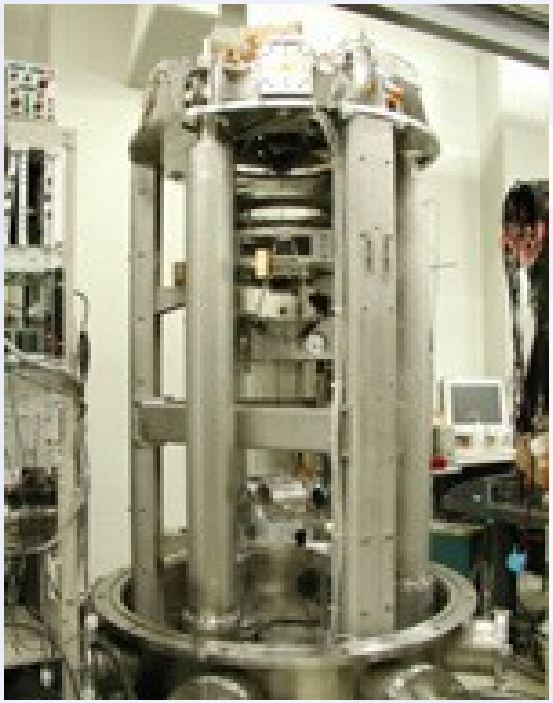
Raman Chemical Imaging System

ARWAN Technology

Laser Source

LOTIS TII

Custom Electronics Systems



Seismic Attenuation Systems

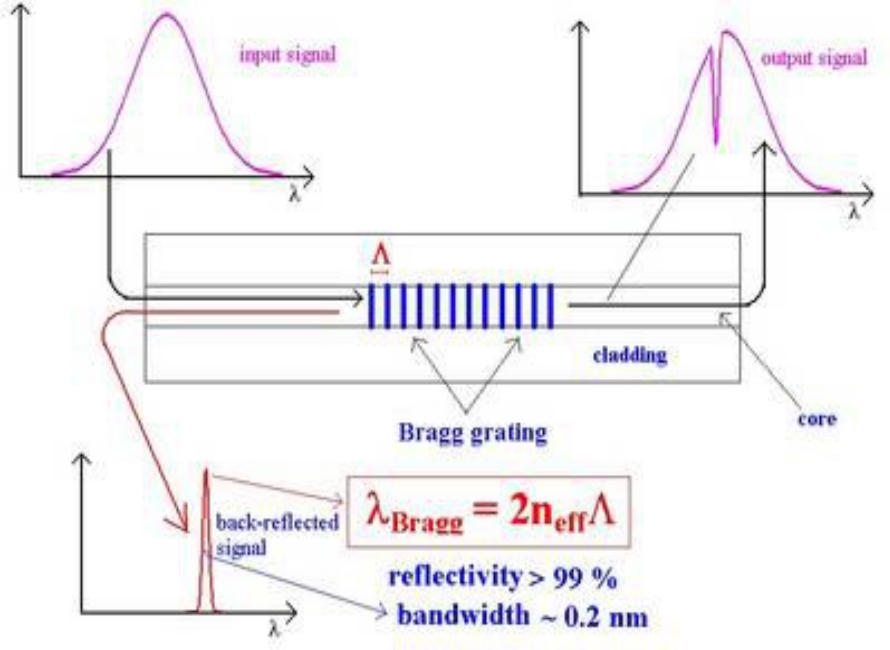
The isolators have been developed within a collaboration between LIGO experiment (CalTech), TAMA experiment (Tokyo University), and Pisa University

ARWAN Technology

Laser Sensors

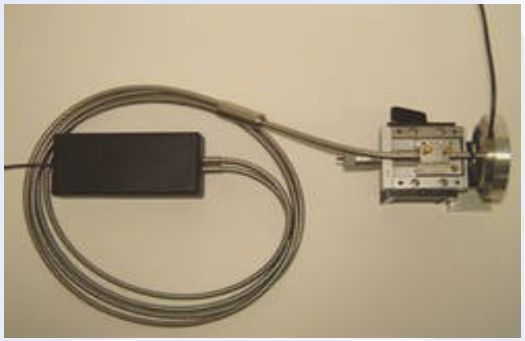
Fiber Optic Sensors based on Bragg Grating

FBG sensors are presently used in the EU project MED-SUV
To monitor the real strain in rocks on the Etna volcano



Custom Lasers Detectors

Nanometric Laser Measuring System to detects nanometric displacements or oscillations



ARWAN Technology

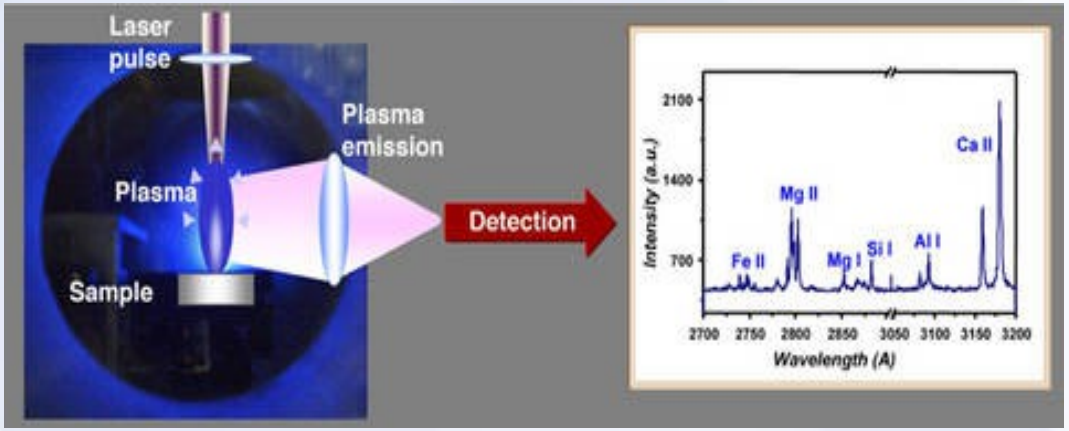
Modi

MObile Dual-pulse Instrument

Fully integrated and transportable system
for LIBS multi-elemental analysis of materials

LIBS - *Laser Induced Breakdown Spectroscopy*

extracting information
on the atomic composition
from the
fluorescence spectrum
of the plasma
generated by a laser pulse on
the sample surface



ARWAN Technology

Applications of a portable LIBS Instrument

- Industry process control
- Materials analysis and studies
- Metallurgic, cement, ceramic, glass, power sectors
- Chemical, pharmaceutical, polymers industry
- Environmental pollution monitoring and diagnostic
- Waters and soils analysis
- Bio-medicine, biology, biochemistry, in-vivo tissues
- Forensic in-situ analysis
- Cultural heritage

In the future...

- Hazardous materials
- Food industry

…and many others...

ARWAN Technology

Original Motivation

- Market of analytical instrumentation is huge
- Taking even a small fraction of such market is appealing
- However, big producers of analytical instruments are not enthusiastic about LIBS
  - Complex interpretation of LIBS spectra
  - Empirical approach dominating
  - Most of LIBS know-how is still “Academic research”
  - No “standard” experimental set-up, procedures or assessed applications
  - No real in-situ measurements

Need for affordable commercial instrumentation to speed up the process of diffusion of LIBS-based applications

Results

Industry ⟷ ***Research***

ARWAN Technology

Thanks for your attention!

ARWAN Technology