DESIGN AND ELECTROMAGNETIC CHARACTERIZATION FOR WIRELESS TECHNOLOGIES

CAMEL PLATFORM

Electromagnetic Modeling and Analysis

› Sensors for autonomous vehicles › Communicating objects › Telecom systems

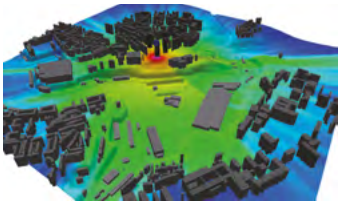
IMT Atlantique
Bretagne-Pays de la Loire
École Mines-Télécom

CAMEL is a platform for the characterization and modeling of high-frequency materials, devices and circuits.

This platform is housed in the Microwave department at IMT Atlantique. CAMEL benefits from our expertise in the field of electromagnetism and offers a wide range of measurement devices and techniques over a very broad frequency spectrum. Many application fields are covered, including 5G, the Internet of Things and communicating objects, terrestrial and space telecommunications, and sensors for autonomous vehicles, among others. In addition, CAMEL relies on an in-house prototyping capacity for the manufacture of the devices to be tested.

Dedicated to collaborative and contractual research, CAMEL provides partners with new test resources enabling them to validate ideas, concepts and technologies experimentally for their future developments.

Multi-scale design and simulation methods



Circuit
> ADS > PSpice
CAO
> HFSS > CST-MWS
> FEKO > HyperMesh
Support
> SolidWorks > LabVIEW > Matlab

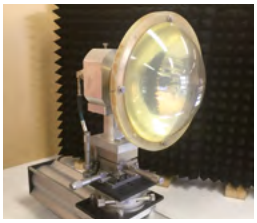
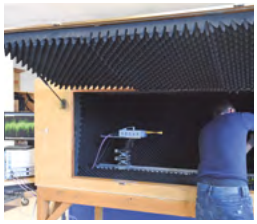
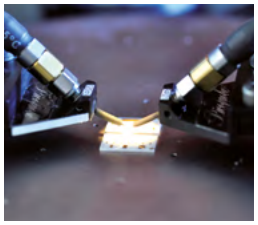
Wide range of equipment

> EEG 256 sensors
> 3D scanners for obtaining meshes
> Under-peak stations
> Vector network analyzer up to 325 GHz
> Spectrum analyzers up to 325 GHz

Ad hoc measuring benches

> Anechoic chambers up to 300 GHz
> Material characterization
> Noise figure and phase noise measurement

Characterization Setups

MATERIALS	RADIATION ANTENNAS & DEVICES	CHANNELS OF PROPAGATION	DEVICES	EEG
				
Characterization of solid, non-solid and multilayer dielectric materials. Free space measurements of S parameters for extraction of complex permittivity in the Ka ; W; D and J bands	Radiation characterization of communicating objects and devices in (sub-)millimeter band. 3D characterization of devices integrating beamforming techniques	Wideband acquisition system with multi-sensors up to 6 GHz for proof-of-concept, channel sounding, and space-time analysis of MIMO channels	Device and component characterizations, passive or active. Measurements on LTCC components up to 170 GHz. Temperature measurements (thermal chuck)	High-resolution electroencephalograph (256 sensors) with low-noise amplifier and complementary electrode localization system by photogrammetry

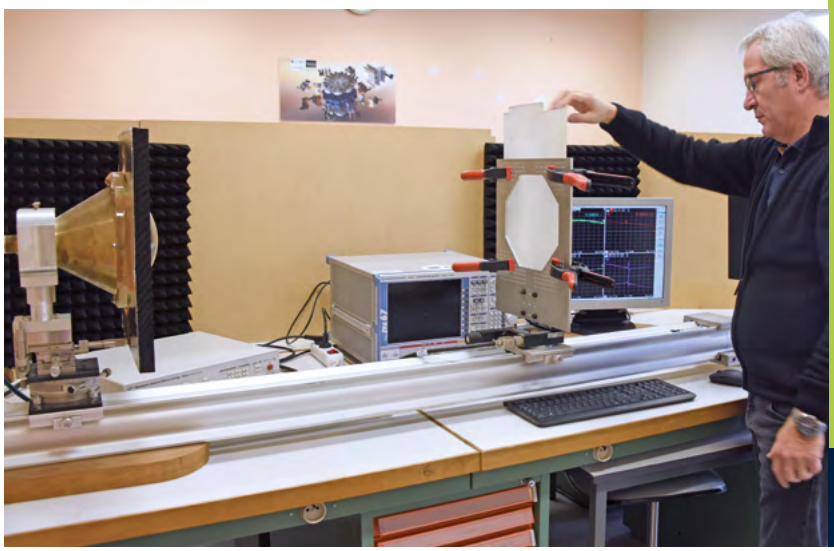
An integrated technological environment

From idea to prototype characterization

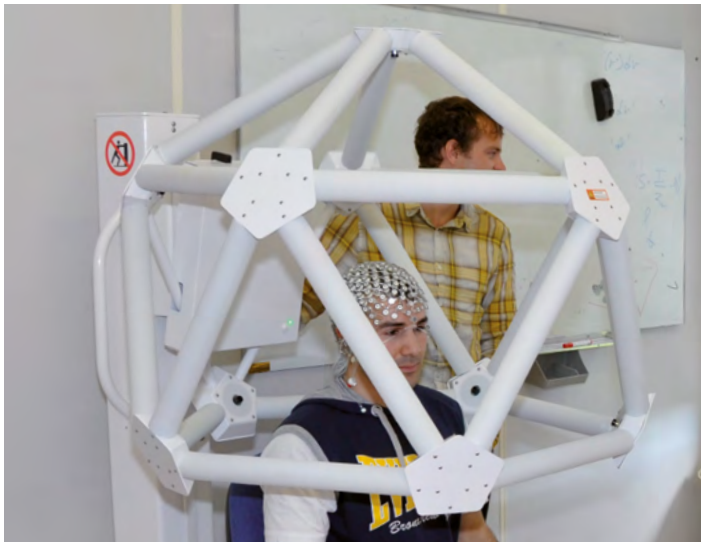
What we offer

For bilateral or collaborative projects:

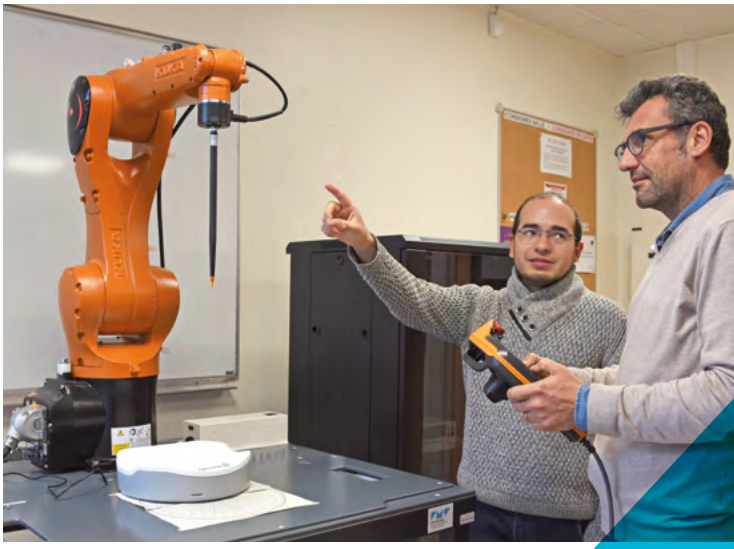
- **Expertise in electromagnetics**
- **Device design (front-end, antennas, ...)**
- **Manufacture and characterization of prototypes**



Quasi-optical bench for the characterization of Ka-band materials



Encephalographic characterization



Communicating system characterization at 60 GHz with active antenna

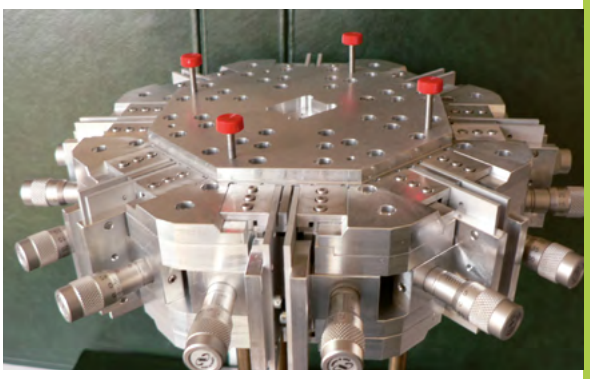
Some success stories

- **ANR «economic impact» award** for the TRIMARAN Project dealing with green MIMO OFDM communications based on micro-structured antennas and time reversal.

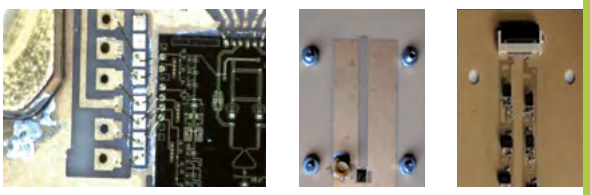
- **“Loading the Future» trophies** at the Image & Networks cluster’s open innovation:
  - **the OptimiSME** project on the design of a multi-standard extender (2018).
  - **the Spatial Modulation** project on the theoretical and experimental study of spatial modulation (2019).

Antenna
64 sensors
5G application

- Material characterization and modeling for automotive and avionics manufacturers and suppliers



Design of a K-band power combiner



Millimeter front-end for 60 GHz platform

The CAMEL platform has received financial support from:

Discover the platforms

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