APPLIED ELECTROMAGNETIC LABORATORY

UNIVERSITÀ DI SIENA
1240

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LAB: APPLIED ELECTROMAGNETISM

Research activity

The Applied Electromagnetics Laboratory (AELab), led by Prof. Maci, is composed of 17 researchers and is one of the most active European research groups in antennas and electromagnetism, with emphasis on:

1) Metasurfaces;

2) Metamaterials and electromagnetic bandgap materials;

3) Numerical Methods for EM;

4) High Frequency Scattering and Diffraction;

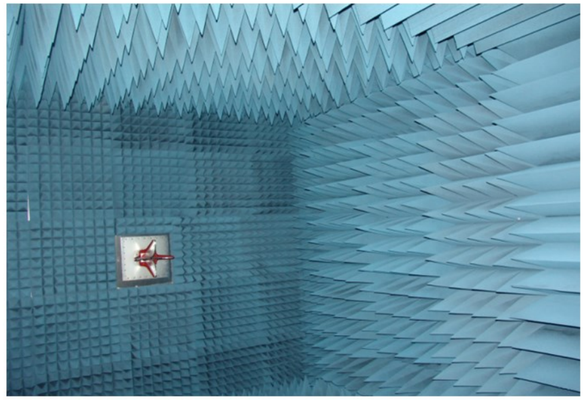
5) Antenna Design;

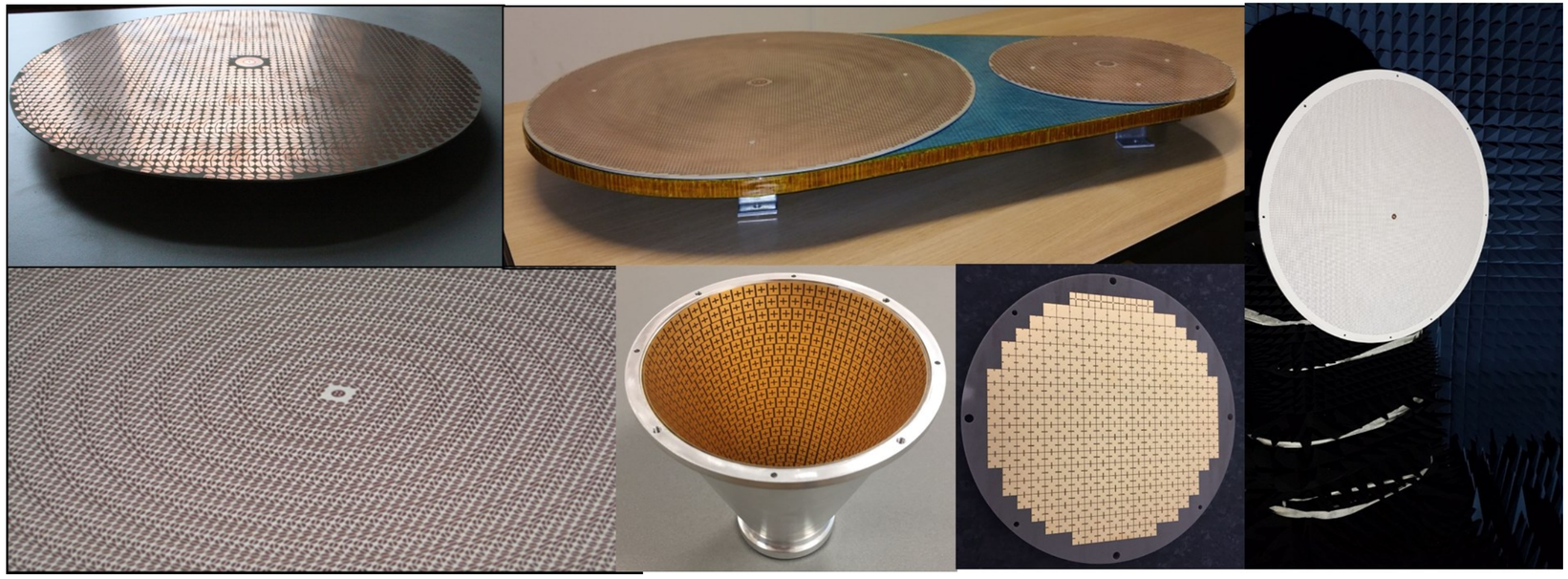
6) Radio Frequency and ID and microwave sensors.

In particular, the AELab has consolidated experience in the modeling and characterization of metasurfaces and metamaterials and in the design of innovative microwave antennas and devices, acquired during research projects both on behalf of industries and international agencies (European Defense Agency, European Space Agency, US Army Research Lab. etc.).. In the space sector, the AELab has played a fundamental role in the development of planar antennas based on Metasurface technology

Over the past 10 years, members of the group have published approximately 200 journal articles and book chapters and 400 conference contributions.

Images





Technologies and services

The unit has at its disposal 120 square meters of labs, dedicated to hardware and software developments, and a fully anechoic chamber. Moreover, related to the significant activity of the unit on analytical and numerical methods and in antenna simulations, a number of software tools are available, both in house developed and commercial (Ansoft Designer, CST Microwave Studio, etc.). The main facilities are:
– network Analyzer Anritsu MS46122A from 1 MHz to 43.5 GHz;

– rapid additive prototyping (Ultimaker 2+);

– fully anechoic shielded chamber for microwave (ETS Lindgren 5m x 3m x 3m, f>600MHz, walls reflectivity -40 dB);

– spherical near field test range in anechoic chamber from 600 MHz to 43.5GHz;

– optimal dynamic range configuration;

– fully remote acquisition and processing system.

The AELab can offer the following services:
- design of customized high performance antennas
- design of metasurfaces for scattering and radiation control
- customized electromagnetic modeling of antennas and scatterers, even in complex operating environments
- electromagnetic simulation of antenna and scattering problems
- antenna measurements

Applications and collaborations

Prof. Stefano Maci is the scientific responsible of two Joint Labs.

The first with Huawei Technologies, called AEE LAB and born in 2018, has the main purpose of conducting research on subjects concerning the application of the EM theory and methods to antennas and components, including but not limited to:

- M-MIMO base station antennas
- Antennas for radio access, backhaul and fronthaul
- Topological and PTD unidirectional modes
- Dielectric Metamaterial (DMTM) and Metasurface (DMTS) Antennas
- Ultrawideband arrays
- Degrees of freedom on the field of antenna arrays
- Multibeam antennas

The second with WAVE UP s.r.l., called MTS Lab and born in 2017, aim to implement new methodologies for software development based on:

- EM models;
- Models and CAD tools of metasurface antennas (MTS),
- Devices and other types of antennas

- Moreover, the group has collaborated and collaborate with Thales Research and Technology of the Thales group (FR), with Ultimetas (FR), with Leonardo (IT) and MBDA (IT)

For more information

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