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## **"Antenna Arrays Analysis"**

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Antenna arrays represent a fundamental technology in several Electromagnetics applicative scenarios, including satellite and ground wireless communications, MIMO systems, remote sensing, biomedical imaging, radar, and radio-astronomy. For instance, phased array systems comprising several hundreds or thousands radiating elements are nowadays commonly used in high-end radars for aerial and maritime platforms.

Because of their wide range of application, the large number of degrees of freedom in the synthesis (comprising the type, position, and excitation of each radiating element in the layout), the available architectures (fully populated, thinned, clustered, etc.), and the possible objectives (maximum directivity, minimum sidelobes, maximum beam efficiency, etc.), antenna arrays have been widely applied and studied.

The objective of the short-course is therefore to provide the attendees the fundamentals of Antenna Arrays, starting from intuitive explanations to rigorous mathematical and methodological insights about their behavior and design.

More in detail, the following topics will be covered during the lessons

- Array Analysis: receiving array in the time domain;
- Array factor (AF) in the time domain;
- Frequency domain array factor;
- Uniform linear array (ULA). AF features: directivity, nulls, lobes, grating lobes, beamwidth, steering, beam broadening, visible range. Broadside and endfire arrays.

Applicative examples, including exercises, corroborated the developed concepts.