



UNIVERSITÀ  
degli STUDI  
di CATANIA



life.augmented

# CAD Solutions for Electromagnetic Simulations

## EM modeling in an industrial context

Catania, Jan 19<sup>th</sup>, 2023 – 10:00 ÷ 13:00

Ing. Giuseppe Greco

CAD Principal Engineer, EMS Competence Center Manager  
and Member of ST Technical Staff

AMS R&D Group – Cad & Design Services

STMicroelectronics Catania



# Agenda

10:00 Presentation of STMicroelectronics

10:15 Short review on electromagnetic fields

- ✓ Brief review of electromagnetics
- ✓ Maxwell's Equations
- ✓ Numerical Methods in Electromagnetics
- ✓ EM fields Applications

10:40 Introduction to EM Industrial software types

- ✓ Quasi-static vs full-wave solutions
- ✓ 2.5D tools
- ✓ 3D tools
- ✓ Multiphysics Suites

11:00 EM Industrial Software Overview

- ✓ Licenses, computational grid and performance aspects
- ✓ Ansys Q3D
- ✓ Ansys Maxwell 3D
- ✓ Ansys SiWave



Keysight Momentum

11:30 Break

11:45 Case study: EMI Simulation Flow

- ✓ International Regulations on EMI
- ✓ LLC Resonant Converter featuring an IPEM
- ✓ 3D Modelling issues
- ✓ RLC Parasitic extraction flow
- ✓ Spice co-simulations and spectra extraction
- ✓ FEM Analysis with excitations
- ✓ Overview on possible issues in using the flow

12:45 Conclusions and Q&A Session

# Presentation of the Seminar

- The growing use of applications whose working frequencies are becoming increasingly high, even in the emerging world of hybrid and electric vehicles, requires management and compliance with technical specifications that concern the world of electromagnetism.
- Especially in the industrial field, the need to be able to predict and manage phenomena of electromagnetic nature becomes fundamental, therefore it becomes necessary to rely on reliable and robust simulation CAD tools validated in an industrial context.
- In this seminar, we will give a short overview of basic theoretical aspects related to the theory of radiation by analyzing the main EM problems and the typical applications in the various contexts of use.
- Some information on the main numerical methods applied to industrial tools will also be provided trying to highlight how these solutions are then made available within commercial tools. An overview of the same will also be provided for the main vendors used in an industrial context such as STMicroelectronics.
- To conclude, a case study will be examined that we have recently finalized with a collaboration between STMicroelectronics–AMS R&D Team and the University of Catania–Electronics Department thanks to a thesis work in which we outlined a simulation flow able to predict the radiated field coming from a power converter used within a charging column for electric vehicles.