ELECTRICAL, ELECTRONICS AND COMMUNICATIONS ENGINEERING

117/Eldor - Design of power converters based on WBG transistors feat. high power efficiency, high power density and reduced electromagnetic emissions

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Context of the research activity	The research deals with the development of innovative architectures of power converters that allow for a better exploitation of last generation SiC power transistors, with the aim to obtain higher power density, higher power efficiency and reduced electromagnetic emissions. Progetto finanziato nell'ambito del PNRR – DM 117/2023 - CUP E14D23002000004
Objectives	Last generation high voltage SiC power transistors are much faster that those of the previous generation, therefore power modules featuring higher power density can be developed. However, this does not come for free, because the 3D integration of power module requires new solutions to address both electromagnetic compatibility and thermal issues, which are usually antithetic. The need to optimize a power converter in terms of conversion efficiency will be combined with that of managing the heat transfer and the stray inductances and capacitances, which propagates the switching noise to the surrounding environment. To this purpose, the output of circuit analyses, that o f thermal and electromagnetic simulations will be taken into account to obtained an optimized solution. The results of the investigations will be at the basis of the design of a prototype that will be fabricated and fully characterized.
Skills and competencies	The successful candidate should have good knowledge of circuit theory,

competencies for the development of the activity	analog and digital electronics, power electronics and electromagnetic compatibility. The knowledge of analysis tools like Simetrix and Ansys HFSS is a plus.