UNIVERSIDAD POLITÉCNICA DE MADRID

Expression of Interest – UPM Supervisor

Marie Skłodowska Curie Action –Postdoctoral Fellowship 2023 (MSCA-PF-2023)

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Department /Institute /Centre	**Name**	Centro de Electronica Industrial Center for Industrial Eelctronics
	Address	Jose Gutierrez Abascal 2
	Province	Madrid
Research Area		Information Science and Engineering (ENG)
Brief description of the Centre/Research Group		**CEI (Centro de Electrónica Industrial)** is a Research Center of the UPM, created in October 2006. P*ower electronics*, mainly in aspects related to power conversion, efficiency and modelling of power converters, is one of the center's leading research topics. **The CEI has a strong research activity both in competitive projects** (European and National) and contracts with Industry worldwide (Europe, USA, China and Australia). CEI has a strong link with industry as it is demonstrated through the direct contract with companies in Europe (ABB, Huawei, Indra, Siemens, Analog Devices, Airbus,) and USA (Ansoft, APEX and General Electric). **During the last 10 years, more than 250 technical papers in journals and conferences have been published, 48 Doctoral Theses and more than 150 Master Theses have been defended.** CEI members participate in international committees as Adcom members, Associate Editors, and have organized International Conferences as PESC'92 (Power Electronics Specialists Conference, IEEE, Toledo 1992), EPE'95 (European Power Electronics, Sevilla 1995) and International Workshop on Power Supply On Chip (PwrSoC). Currently, **the CEI has 41 active research projects of which 20 are competitive national** and European, while the rest with are directly contracted projects by national and international private companies. In the terms of human resources, the CEI is made up of 18 teaching doctor researchers and 33 junior researchers hired. The CEI has a laboratory space of 100m2 with the voltage sources and active loads up to 5kV and 100kW, high frequency oscilloscopes and other auxiliary equipment that will fully support the proposed activity.

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Project description	The primary aim of the proposed project is to provide a new paradigm for the problem of high frequency power electronics scaling by offering a novel solution for galvanic isolation that does not use the variable magnetic flux principle for the energy processing. The project's provocative driver idea of solid-state isolation will break with the conservative approaches to implement the voltage transformation and isolation via magnetic transformer, proposing an original research plan to engage the problem we want to resolve. Its successful resolution will impact one of the biggest societal challenges of our time: the energy transition, and this project is directly related to the removal of magnetic transformer from the power loop by developing the **magnetic-free isolated DC Energy Portal**, a multiport isolated component that provides voltage transformation, bi-directional energy flow and protection through **direct DC-DC conversion**, without time variable magnetic flux. The project will develop a horizontal technology that will be available to support different applications where energy efficiency and power density are of crucial importance. By a successful implementation of this project **we will impact**: • The new methods for more efficient, more compact and easily scalable isolated power conversion needed for clean transportation or big data centers • The development of the new high frequency Direct Current (DC) isolated multiport systems • Energy efficiency and power density in the applications related with DC multiport power distribution
Applications: documents to be submitted and deadlines	We expect CV and letter of references until April 30th 2023