



**University of Pavia**

**Ph.D. School in Electronics, Computer Science and Electrical Engineering**

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## **SEMINAR**

# **Microwave Applications for Snow Monitoring: from theory to practice**

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**Aula Ricciardi – Dipartimento di Ingegneria Civile ed Architettura**

**Abstract:** Snow is a very important environmental variable and a primary water resource in many areas of the world. Monitoring seasonal snowpack properties is crucial for properly managing snow-related hazards such as snow avalanches and snowmelt-floods. Microwave radars have been proposed as a mean to non-destructively monitor snowpacks, but they face several problems. From the electromagnetic point of view, snow is a complex material that can change its electromagnetic properties within seconds. Moreover, it is almost impossible to be studied inside a laboratory and some of the sites for studying the snow in good conditions can be hard-to-reach and with adverse meteorological conditions. All these aspects make the study of snow a real challenge. This seminar will focus on the techniques to study the snow using microwaves and how these techniques are applied in the field.

**Bio:** Guido Luzi graduated in Physics and holds a PhD in Electronic Systems Engineering. He has been working since 1986 in microwave remote sensing, active and passive, both in industrial and research institutions, dedicating his work to the development and experimentation of microwave sensors. He was involved in several international remote sensing campaigns as AGRISCATT87, AGRISCATT88, MACEurope, EPOCH, MEDALUS II, ENVIRONMENT, GALAHAD and several national research contracts. He worked for the Department of Electronics and Telecommunications and the Department of Earth Sciences of the University of Florence, working on various applications from monitoring volcanic areas as the Stromboli Island, to the development and experimentation of microwave sensors for the detection of vital signs (heart beat and breath), or Civil Engineering and Cultural Heritage applications. He moved to the Institute of Geomatics in 2010, where he was involved in the design and experimentation of radar-based sensing techniques with emphasis on GB-SAR interferometry. He has mainly focused his interest towards geophysical applications, with emphasis in the observation of landslides through terrestrial and satellite microwave interferometry and civil structures monitoring. He has authored or co-authored many papers in international journals concerning the aforementioned topics, and published more than sixty papers in referred international journals. He acts as referee for different journals: IEEE Trans. On Geoscience and Remote Sensing, IEEE Geoscience Remote Sensing Letters, Int. Jour. of Remote Sensing, IEEE Selected Topics in Applied Earth Observations. He is with the Remote Sensing Department (Geomatics Division) of the CTTC since January 2014, where he is involved in research activities concerning the application of spaceborne and terrestrial radar techniques.

Pedro Espín-López was born in Murcia, Spain, in 1989. He received the M.S. degree in electronic engineering from the Technical University of Cartagena, Spain, in 2015. During 2015-2016 he worked with the European Institute of Oncology (IEO) as research fellow. His work was focused on the study of non-ionizing dosimetry and the assessment of safety for a breast cancer detection system using millimetre and sub-millimetre waves. In 2020, he received the Ph.D. in electronics from the University of Pavia thanks to his research activities on the study and development of microwave and millimetre wave radar systems, paying special attention to the monitoring of the snow cover. Currently he is working at the Centre Tecnològic de Telecomunicacions de Catalunya (CTTC) as Researcher in the Geomatics Research Unit.

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