Title: Chip-integrated spin detection for biomedical applications

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Abstract: Nuclear magnetic resonance (NMR) and electron paramagnetic resonance (EPR) are two of the prime modalities for probing molecular structure in the biomedical context and analysing bulk material properties for quality control, food product analysis, and non-destructive testing. Conventional state-of-the-art NMR and EPR spectroscopy systems use bulky superconducting magnets, have a room-filling size, and cost millions of euros. Over the past decade, advances in permanent magnet technology have led to the availability of benchtop MR spectrometers and even smaller MR relaxometers for analysing bulk material properties and performing immunoassays. With the availability of miniaturized MR-grade magnets, NMR and EPR electronics have entered the focus of attention as the key component for miniaturized, portable MR devices. In this talk, we will discuss the so-called MR-on-a-chip approach, in which all required electronics are realized on a single integrated circuit, allowing for a realization in an ultra-small form factor and offering great promise for reducing the overall system cost. After a brief introduction to the topic and a short review of conventional MR electronics, including its key performance metrics, the main part of the talk discusses the key components of MR-on-a-chip transceivers, including state-of-the-art example implementations.

Author / Presenter BIO:

- PhD in Microsystems and Microelectronics from EPFL in 2011
- Since 2017, he is a Full Professor and the Director of the Institute of Smart Sensors at the University of Stuttgart
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- Dr Anders is the author/co-author of more than 150 conference and journal publications, several international patents, as well as five books and book chapters.
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