Non-Coherent MIMO Communications from Massive to Cell-Free

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Abstract*—*In this talk, we introduce the concept of non-coherent communications and explain why this is a timely approach for massive multiple-input multiple-output (MIMO), given the trends and requirements shaping the next generation of mobile communications. In particular, high mobility and extended range remain challenges that current technologies do not fully address. We then present the fundamentals of differential modulation-based approaches, followed by a review of practical considerations, including their integration with orthogonal frequency division multiplexing (OFDM) waveforms and beamforming. We also discuss multi-user constellations for multiplexing several users on the same time-frequency resources, performance under more realistic Rician channel conditions, and the extension of these techniques to cell-free massive MIMO.

Index Terms*—*Beamforming, cell-free massive MIMO, differential modulation, massive MIMO, multi-user communications, non-coherent communications, OFDM, Rician channels.

I. SPEAKER BIOGRAPHY

Ana García Armada is a Professor at Universidad Carlos III of Madrid, Spain, where she leads the Communications Research Group. She has been a visiting scholar at Stanford University, Bell Labs, and the University of Southampton. She is an IEEE Fellow and has published more than 300 papers in international journals and conference proceedings. She holds seven granted patents, all related to wireless communications.

She was awarded third place in the Bell Labs Prize 2014 for shaping the future of information and communications technology. Her service distinctions include the Outstanding Service Award from the IEEE Communications Society Signal Processing and Communications Electronics Technical Committee, the Outstanding Service Award from the IEEE Communications Society Women in Communications Engineering Standing Committee, and the IEEE Communications Society and Korean Institute of Communications and Information Sciences Exemplary Global Service Award.

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