Speaker: Prof. Dr. André L. F. de Almeida

Title: "Tensor-based channel estimation for intelligent reflecting surface assisted MIMO communications"

Abstract: Intelligent reflecting surface (IRS) is an emerging technology for future wireless communications including 5G and especially 6G. It consists of a large 2D array of (semi-)passive scattering elements that control the electromagnetic properties of radio-frequency waves so that the reflected signals add coherently at the intended receiver or destructively to reduce co-channel interference. The promised gains of IRS-assisted communications depend on the accuracy of the channel state information. In this talk, we discuss the receiver design for an IRS-assisted multiple-input multiple-output (MIMO) communication system via tensor modeling approaches. First, considering a structured time-domain pattern of pilots and IRS phase shifts, we present two channel estimation methods that rely on a parallel factor (PARAFAC) tensor modeling of the received signals. The common feature of both methods is the decoupling of the estimates of the involved MIMO channel matrices (base station-IRS and IRS-user terminal), which provides performance enhancements in comparison to competing methods that are based on unstructured LS estimates of the cascaded channel. We also present a semi-blind approach to the joint channel estimation and data detection problem that relies on a generalized PARATUCK tensor model of the signals reflected by the IRS via a two-stage closed-form algorithm using Khatri-Rao and Kronecker factorizations schemes.