

Near-Field MIMO: An Old Theory Up to New Tricks

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ABSTRACT:

We are in the midst of a tidal transformation in the conditions in which wireless systems operate, with a determined push towards higher frequencies (today mmWave, tomorrow sub-terahertz), with shrinking transmission ranges, and with denser antenna arrays. This is stretching, even breaking, time-honored modelling assumptions such as that of planar wavefronts over the arrays. And, once the local curvature of those wavefronts is nonnegligible, a new opportunity arises for spatial multiplexing without any need for multipath components. Conveniently, spatial multiplexing can then rely on the line-of-sight propagation path or the strong specular reflections that tend to dominate at those high frequencies and over short ranges. This presentation dwells on the physical underpinnings of this phenomenon, on how it can be harnessed for communication purposes, and on its potential implications for future systems.

BIO:

Angel Lozano is a Professor at UPF, Barcelona. He received his Ph.D. in Electrical Engineering from Stanford University in 1999, worked for Bell Labs (Lucent Technologies, now Nokia) between 1999 and 2008, and served as Adj. Associate Professor of Electrical Engineering at Columbia University between 2005 and 2008. Prof. Lozano is a Fellow of the IEEE. His publication record is extensive, including the textbook “Foundations of MIMO Communication” released by Cambridge University Press in 2019, and he holds 16 patents. His papers have received several awards, including the 2009 Stephen O. Rice prize to the best paper published in the IEEE Transactions on Communications, the 2016 Fred W. Ellersick prize to the best paper published in the IEEE Communications Magazine, and the 2016 Communications Society & Information Theory Society joint paper award. He is also the recipient of an ERC Advanced Grant, a Highly Cited Researcher, and a Distinguished Lecturer of the IEEE Communications Society.