Title: *New Frontiers in One-Bit Signal Processing: From Sample Abundance to Unlimited Sampling*

Abstract:
Consider the tale of an elephant in the dark: a group of careful villagers each touch only part of the creature—one feels a tusk, another the trunk, and another an ear—leading to fragmented and incomplete conclusions. With more touches, even if imprecise, they could build a clearer picture. This analogy captures the essence of one-bit sampling: leveraging a large number of low-resolution samples to better observe signals.

This presentation delves into the technical breakthroughs enabled by one-bit signal processing. We begin by examining the concept of sample abundance, where the dramatic increase in low-resolution samples enhances signal recovery while reducing computational complexity. Using one-bit phase retrieval as a case study, we show how constraints like semi-definiteness and rank, often computationally prohibitive, become unnecessary as the sample size grows. Efficient algorithms such as the randomized Kaczmarz algorithm (RKA) emerge as elegant solutions for solving the resulting linear feasibility problems.

The final segment introduces the UNO framework, which integrates one-bit quantization with unlimited sampling to address dynamic range limitations. By employing judiciously designed thresholds, UNO encodes the distance between the signal and threshold values, enabling accurate signal reconstruction via advanced RKA techniques. This unified approach achieves high dynamic range, efficient sampling, and low-power, practical implementations for modern systems.