Contribution ID: **27** Contribution code: **S4 High Energy and Particle Physics** Type: **Invited Speaker**

Memorization and Prediction Capability of Interacting Phase Oscillators

Thursday 23 June 2022 11:30 (15 minutes)

Nonlinear dynamical systems, such as well-tuned recurrent neural networks, have proved a powerful tool for modeling temporal data. However, tuning such models to achieve the best performance remains an outstanding challenge, not least because of the complex behaviors that emerge from interacting microscopic constituents. Here, we consider a minimal model of two interacting phase oscillators coupled to a thermal bath and driven by a common signal. We quantify the memory and predictive capability of the system with the mutual information between the phases of oscillators and the signals at different times. We show that the interaction between oscillators can increase the information between the system and the signal. We attribute this behavior to an increase in the effective signal-to-noise ratio, resulting from a stronger correlation between the oscillators. Our work offers a first step toward a systematic approach to optimize interacting nonlinear dynamical systems for memorizing and predicting temporal patterns.

Author: Mr KUMPEERAKIJ, Chanin

Presenter: Mr KUMPEERAKIJ, Chanin

Session Classification: S4 High Energy and Particle Physics

Track Classification: High Energy and Particle Physics