## CRM9 ?

## A mesoscopic theory for coupled stochastic oscillators | Victor Buendía Ruiz-Azuaga

The celebrated Ott-Antonsen ansatz for coupled oscillators provides a useful framework to work with deterministic systems in the thermodynamic limit, but remains just an approximation for stochastic models. In this work, I construct a general mesoscopic description of finite-sized populations of stochastic coupled oscillators and apply it to study the stochastic Kuramoto model. From such a mesoscopic description it is possible to obtain the natural, multiplicative fluctuations of the oscillator ensemble. The analysis allows one to derive highly accurate, closed expressions for the stochastic Kuramoto model's order parameter for the first time. Moreover, it is possible to get novel insights into the system's fluctuations and the synchronization transition's critical exponents which were inaccessible before. I will also show work-in-progress results for excitable oscillators, including theta-neurons.

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INTERNATIONAL CONFERENCE OF MATHEMATICAL NEUROSCIENCE O June 17 - 20, 2025

PRBB, Barcelona