



Dr. Michael Rosenblum, *Potsdam University, Germany*

Michael Rosenblum has been a research associate in the Department of Physics, University of Potsdam, since 1997. His main research interests are synchronization theory, time series analysis, and application of nonlinear dynamics to biological systems. He was a Humboldt fellow in the Max-Planck research group on nonlinear dynamics at Potsdam University, and a visiting scientist at Boston University. Michael Rosenblum studied physics at Moscow Pedagogical University, and went on to work in the Mechanical Engineering Research Institute of the USSR Academy of Sciences, where he was awarded a PhD in physics and mathematics. He received his habilitation degree in theoretical physics from Potsdam University.

Keynote: Self-organized quasiperiodic dynamics in ensembles of nonlinearly coupled oscillators

We briefly discuss synchronization and appearance of collective motion in large ensembles of all-to-all coupled oscillators. We illustrate the effect by several real world examples and present a theoretical description in the framework of the Kuramoto model. Next, we present recent results on collective dynamics of populations of nonlinearly coupled oscillators and discuss a corresponding generalization of the Kuramoto model. In particular, we demonstrate a transition from fully synchronous periodic oscillations to partially synchronous quasiperiodic dynamics in ensembles of identical oscillators with coupling that nonlinearly depends on the generalized order parameters. We present an analytically solvable model that predicts a regime where the mean field does not entrain individual oscillators, but has a frequency incommensurate to theirs. The self-organized onset of quasiperiodicity is illustrated with Landau-Stuart oscillators, Josephson junction array with a nonlinear coupling, and ensembles of chaotic Rössler oscillators.
