

Department of Physical Chemistry
and Materials Sciences

Departmental Seminar

Date: 14:00 Thursday, December 4, 2014

Place: Room BE-401-3

(Béke épület IV. emeleti Olvasó)



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Recipient of Humboldt Reinvitation Award

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Synchronization in Populations of Chemical Oscillators: Quorum Sensing, Phase Clusters and Chimeras

Abstract

We have studied large, heterogeneous populations of discrete chemical oscillators (~100,000) to characterize two different types of density-dependent transitions to synchronized behavior, a gradual Kuramoto synchronization and a sudden quorum sensing synchronization. We also describe the formation of phase clusters, where each cluster has the same frequency but is phase shifted with respect to other clusters, giving rise to a global signal that is more complex than that of the individual oscillators. Finally, we describe experimental and modeling studies of chimera states and their relation to other synchronization states in populations of coupled chemical oscillators.

A. F. Taylor et al., Science 323, 614 (2009).

A. F. Taylor et al., Angewandte Chemie Int. Ed. 50, 10161 (2011).

M. R. Tinsley et al., Nature Physics 8, 662 (2012).

S. Nkomo, et al., Phys. Rev. Lett. 110, 244102 (2013).