Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Title: Chimeras in small, globally coupled networks: Experiments and stability analysis JOSEPH D. HART, University of Maryland, College Park, KANIKA BANSAL, None, THOMAS E. MURPHY, RAJARSHI ROY, University of Maryland, College Park — Since the initial observation of chimera states, there has been much discussion of the conditions under which these states emerge. The emphasis thus far has mainly been to analyze large networks of coupled oscillators; however, recent studies have begun to focus on the opposite limit: what is the smallest system of coupled oscillators in which chimeras can exist? We experimentally observe chimeras and other partially synchronous patterns in a network of four globally-coupled chaotic opto-electronic oscillators. By examining the equations of motion, we demonstrate that symmetries in the network topology allow a variety of synchronous states to exist, including cluster synchronous states and a chimera state. Using the group theoretical approach recently developed for analyzing cluster synchronization, we show how to derive the variational equations for these synchronous patterns and calculate their linear stability. The stability analysis gives good agreement with our experimental results. Both experiments and simulations suggest that these chimera states often appear in regions of multistability between global, cluster, and desynchronized states.

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Date submitted: 06 Nov 2015 Electronic form version 1.4