First-principles calculation of phase and amplitude dynamics for coupled Wien-bridge oscillators DAVID MERTENS, Department of Physics, Eckerd College, LARS ENGLISH, Department of Physics and Astronomy, Dickinson College, PANOS KEVREKIDIS, Department of Mathematics and Statistics, University of Massachusetts, Amherst — We present the nonlinear phase and amplitude dynamics of coupled Wien-bridge oscillators. A Wien-bridge oscillator is a classic electronic realization of a tunable autonomous oscillator in which positive feedback drives a clipped frequency filter. Such oscillators have been recently utilized in synchronization experiments; simplicity and low cost makes this design a prime candidate for experiments on large populations. However, there has been no established link between the underlying electronic components and the amplitude and phase dynamics. Using the method of multiple time scales, we derived the equations governing the slow evolution of the oscillators. In this talk we will present the result of our analysis as well as a comparison with measurements for two oscillators. We will finish by generalizing the theory to the case of many interacting oscillators.

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