1086-39-1665 **Chuan Zhang*** (zhang@math.colostate.edu), Department of Mathematics, Colorado State University, Fort Collins, CO 80523-1874, and **Gerhard Dangelmayr** and **Iuliana Oprea**.

Learning Cycles in Hopfield-type Networks with Delayed Coupling.

Cyclic patterns of neuronal activity are ubiquitous in neural systems of almost all animal species. To elucidate the underlying dynamical mechanisms for the storage and retrieval of cyclic patterns in neural networks is fundamentally important for understanding the origin of rhythmic movements. In this presentation, we summarize our investigations in the storage and retrieval of binary cyclic patterns in continuous, asymmetric Hopfield-type networks with delayed coupling using the pseudoinverse learning rule. The presentation is organized into three parts. First, we show that all cyclic patterns satisfying the transition conditions can be successfully stored and retrieved, and the cyclic patterns satisfying the same transition condition can be stored in the same network, and retrieved with appropriately selected initial conditions. Next, we show how the subspace structures of the vector space spanned by the row vectors of the cyclic patterns determine the topology of the networks constructed from these cyclic patterns. Last, we show that transitions from fixed points to attracting limit cycles (cyclic patterns) are multiple saddle-node bifurcations on limit cycles. (Received September 26, 2012)