1053-92-6 **Alan A Veliz-Cuba*** (alanavc@vt.edu) and **Brandilyn Stigler**. *Network Topology as a Driver of Bistability in the Lac Operon.*

The lac operon in Escherichia coli has been studied extensively and is one of the earliest gene systems found to undergo both positive and negative control. The lac operon is known to exhibit bistability, in the sense that the operon is either induced or uninduced. Many dynamical models have been proposed to capture this phenomenon. While most are based on complex mathematical formulations, it has been suggested that for other gene systems network topology is sufficient to produce the desired dynamical behavior. We present a Boolean network as a discrete model for the lac operon. We include the two main glucose control mechanisms of catabolite repression and inducer exclusion in the model and show that it exhibits bistability. Further we present a reduced model which shows that lac mRNA and lactose form the core of the lac operon, and that this reduced model also exhibits the same dynamics. This work corroborates the claim that the key to dynamical properties is the topology of the network and signs of interactions. (Received March 06, 2009)