1128-92-92 **Eric Cytrynbaum*** (cytryn@math.ubc.ca). *An invariant winding number for the FitzHugh-Nagumo system.*

The FitzHugh-Nagumo system of partial differential equations (FHN) is a generic model for excitable media, often used to build a qualitative understanding of electrophysiological phenomena. A well-characterized traveling-pulse solution to FHN serves as a model for action potentials in cardiac tissue and other contexts. The stability of the traveling pulse has been well-studied but the more global problem of predicting when an arbitrary initial condition will converge to the uniform rest solution and when it will converge to the traveling pulse remains unsolved. In this talk, I will present a proof of the existence of an invariant winding number in an asymptotic limit of the FHN system (the singular FHN system - SFHN) on a circular 1D domain that provides a crucial step toward a global convergence result. I will also provide evidence that this SFHN winding number result extends with limitations to FHN and outline conditions under which the SFHN approximation fails. The invariant winding number provides explanations for several observations of physiological relevance. For example, it explains the requirements on stimulus protocols that allow the formation and elimination of reentrant rhythms in cardiac tissue. (Received February 15, 2017)