1014-37-577 **Andrey Shilnikov*** (ashilnikov@gsu.edu), Dept Mathemetics and Statistics, 30 Pryort Street, Atlanta, GA 30303, **Gennady Cymbalyuk** (gcym@phy-astr.gsu.edu), Department of Physics and Astronomy, Atlanta, GA 30303, and **Paul Channell**, Dept Mathematics & Statistics, 30 Pryor Street, Atlanta, GA 30303. *Applications of the Poincaré mapping technique to analysis of neuronal dynamics.*

Understanding generic mechanisms of evolution and transitions between distinct types of neurons' activity is a fundamental problem for determining basic principles of the neuron functioning. We develop a suite of tools based on the Poincare return mapping technique to analyze both observable and hidden organizing centers of dynamics of the membrane potential and slow channel currents in neural models. Knowledge of the structure of such a map allows one to study in detail aperiodic and aperiodic tonic spiking and bursting oscillations. One of the most critical problems in an experimental analysis of neuronal dynamics is that one can effectively measure only one state variable, the membrane potential, of all other ones determining the kinetics of ionic currents, i.e. activation and inactivation variables play crucial roles in generating activity patterns. The method suggested here and implement as an experimental procedure should allow one to assess the dynamics of the slow variables by a particular analysis of the fast membrane potential. (Received September 20, 2005)