

**SYNCHRONIZATION AND PROPAGATION OF OSCILLATORY ACTIVITY:
MULTI-STABILITY AND HYSTERESIS**

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Oscillatory activity of cells has been the topic of many studies. Oscillatory activity can be due to action potential firing corresponding to the well-known Hodgkin-Huxley (HH) type dynamics of ion-channels in the cell membrane or due to HH-type IP₃-mediated calcium oscillations in the endoplasmic reticulum (ER) causing periodic oscillations of calcium transients in the cytosol. We show analytically that coupling of these two oscillatory mechanisms reveals a complex, rich spectrum of both stable and unstable states of cells with hysteresis. The predicted bi-stability corresponds to experimentally observed cell states. Coupling of these oscillatory systems in the cell provides a robust mechanism for intra- and intercellular signaling by propagation of activity in a network of cells.