Experimental and theoretical evidence for fluctuation driven activations in an excitable chemical system

HAROLD HASTINGS, SABRINA SOBEL, Hofstra University, RICHARD FIELD, University of Montana, SCOTT MINCHENBERG, NICOLE SPINELLI, KEITH ZAUDERER, Hofstra University — An excitable medium is a system in which small perturbations die out, but sufficiently large perturbations generate large “excitations.” Biological examples include neurons and the heart; the latter supports waves of excitation normally generated by the sinus node, but occasionally generated by other mechanisms. The ferroin-catalyzed Belousov-Zhabotinsky reaction is the prototype chemical excitable medium. We present experimental and theoretical evidence for that random fluctuations can generate excitations in the Belousov-Zhabothinsky reaction. Although the heart is significantly different, there are some scaling analogies.

1This material is based upon work supported by the Department of Energy under Award Number DE-FG02-08ER64623.

Harold Hastings
Hofstra University