Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Individuals in the crowd: studying bacterial quorum-sensing at the single-cell level[1] PABLO DELFINO PEREZ, JONATHAN YOUNG, ELAINE L. JOHNSON, STEPHEN J. HAGEN, University of Florida, Physics Department, Gainesville FL 32611-8440 USA — Like many bacterial species, the marine bacterium *Vibrio fischeri* can detect its own population density through a quorum sensing (QS) mechanism. The bacterium releases a small molecule signal – the autoinducer (AI) – into its environment: high AI concentration indicates high population density and triggers a genetic switch that, in *V.fischeri*, leads to bioluminescence. Although the QS behavior of bulk cultures of *V.fischeri* has been extensively studied, little is known about either the response of individual cells to AI signal levels or the role of noise and local diffusion in QS signaling. We have used a photon-counting camera to record the luminescence of individual *V.fischeri* cells immobilized in a flow cell and subject to varying concentrations of AI. We observe that light output by individual cells varies not only with bulk AI concentration, but also over time, between cells, with local (micron-scale) population density, and even with the flow rate of the medium. Most of these variations would not be evident in a bulk culture. We will present an analysis of this heterogeneity at the cell level and its implications for the role of noise in QS signaling.

[1]Supported by NSF MCB #0347124.

Stephen Hagen
University of Florida, Physics Dept

Date submitted: 28 Nov 2008 Electronic form version 1.4