Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

High-resolution, long-term characterization of bacterial motility using optical tweezers[1] PATRICK J. MEARS, TAEJIN L. MIN, LON M. CHUBIZ, CHRISTOPHER V. RAO, IDO GOLDING, YANN R. CHEMLA, University of Illinois at Urbana-Champaign — We present a single-cell motility assay, which allows the quantification of bacterial swimming in a well-controlled environment, for durations of up to an hour and with a temporal resolution greater than the flagellar rotation rates of approximately 100 Hz. The assay is based on an instrument combing optical tweezers, light and fluorescence microscopy, and a microfluidic chamber. Using this device we characterized the long-term statistics of the run-tumble time series in individual *Escherichia coli* cells. We also quantified higher-order features of bacterial swimming, such as changes in velocity and reversals of swimming direction. Additionally, we investigated the effects of flagella number on swimming parameters including speed and tumble frequency.

[1]Work supported by the NSF Center for the Physics of Living Cells (grant 082265) and NIH Institutional National Research Service Award in Molecular Biophysics (PHS 5 T32 GM08276).

Patrick J. Mears
University of Illinois at Urbana-Champaign

Date submitted: 17 Nov 2009 Electronic form version 1.4