Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

A Quantitative Model of Motility Reveals Low-Dimensional Variation in Exploratory Behavior Across Multiple Nematode Species STEPHEN HELMS, FOM Institute AMOLF, LEON AVERY, Virginia Commonwealth Univ., GREG STEPHENS, Vrije Universiteit, TOM SHIMIZU, FOM Institute AMOLF — Animal behavior emerges from many layers of biological organization—from molecular signaling pathways and neuronal networks to mechanical outputs of muscles. In principle, the large number of interconnected variables at each of these layers could imply dynamics that are complex and hard to control or even tinker with. Yet, for organisms to survive in a competitive, ever-changing environment, behavior must readily adapt. We applied quantitative modeling to identify important aspects of behavior in chromadorean nematodes ranging from the lab strain *C. elegans* N2 to wild strains and distant species. We revealed subtle yet important features such as speed control and heavy-tailed directional changes. We found that the parameters describing this behavioral model varied among individuals and across species in a correlated way that is consistent with a trade-off between exploratory and exploitative behavior.

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Date submitted: 08 Nov 2013 Electronic form version 1.4