

# Advancing Biophysics and Soft Matter Physics



M. Lisa Manning  
Associate Professor, Physics

## CURRENT RESEARCH

### Making predictions in health and material science using analytical physics tools

While cell biology has typically focused on activities that happen inside single cells, many important biological processes involve cells interacting strongly with one another to generate large-scale patterns. Even the simplest interactions between large numbers of cells can yield surprisingly complex behaviors, and therefore predictions based on simple models can be very powerful in understanding processes like wound healing, cancer metastasis, or congenital disease. Dr. M. Lisa Manning, Associate Professor of Physics at Syracuse University, uses a set of tools from statistical and soft matter physics that are uniquely suited to these strongly interacting groups of cells, and works closely with other interdisciplinary scientists in biology, bioengineering, and medicine to make predictions about complex systems with practical applications. Using both computer simulations and theoretical physics tools, Dr. Manning develops predictive models for cell interactions, working closely with biologists and medical professionals to test those hypotheses and generate new ideas about how to treat diseases.

For example, recent theoretical predictions developed by the Manning group have been remarkably accurate in predicting cell shapes and cell motion in specific tissues, including those from human asthma patients and breast cancer cell panels. Interestingly, some of these same tools and techniques can be applied to a very different set of problems in materials science. For example, by identifying and analyzing the dynamics of "soft spots" or flow defects in certain granular materials that play an important role in earthquakes, Dr. Manning is able to more accurately predict friction and failure in these solids. These flow...

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## AFFILIATION



Syracuse University

## EDUCATION

- Ph.D. in Physics, University of California, Santa Barbara

## AWARDS

- Cottrell Scholar, Research Corporation, 2015
- Scialog Fellow, Moore Foundation & Research Corporation, 2014
- Physics Department Teaching Award, Phys 211, Syracuse University, 2014
- Research Fellow, Alfred P. Sloan Foundation, 2014
- Physics Department Teaching Award, Phys 576, Syracuse University, 2013

## RESEARCH AREAS

Life Science, Genomics / Congenital, Oncology / Cancer, Materials Science / Physics

## FUNDING REQUEST

Your contributions will support the continued research of Dr. M. Lisa Manning at Syracuse University as she studies interactions of large groups of cells that have practical implications in health, as well as disordered and granular solids important with practical applications in material sciences. Donations will support the approximate \$285K/year required for personnel, computing, and travel. Help facilitate breakthroughs in cancer, asthma, and materials science by funding Dr. Manning!