



Physical – Life Sciences Interface

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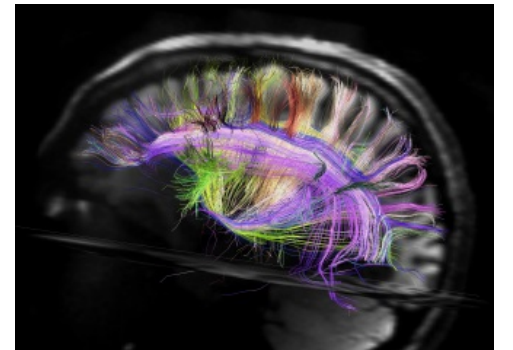
BIO2010: Transforming Undergraduate Education for Future Research Biologists, National Academies Press, 2003

“Biological concepts, models, and theories are becoming more quantitative, and the connections between the life and physical sciences are becoming deeper and stronger.”

Research at the Intersection of the Physical and Life Sciences, National Academies Press, 2010

Report Identified Five Grand Challenges

- Synthesizing Lifelike Systems
- Understanding the Brain
- Predicting Individual Organisms’ Characteristics from their DNA Sequence
- Interactions of the Earth, Its Climate, and the Biosphere
- Understanding Biological Diversity





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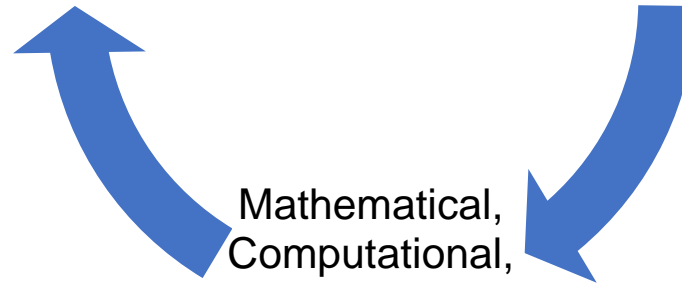
Molecular Synthesis in the Cell
Information Processing in the Brain
Complex, Multi-Scale Networks
Open, Non-Linear Systems

The Living
World –
A Laboratory
for the
Physical
Sciences



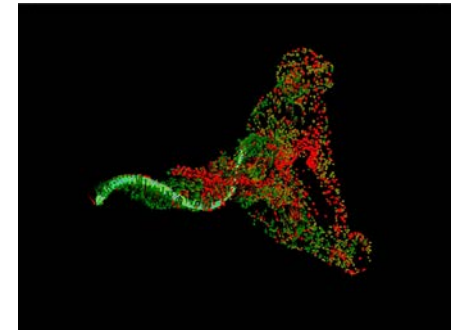
Understanding
Structure,
Patterns,
Dynamics, and
Function

Catalysts for Drug Making
Paradigms for Information Storage
Synthesis of New Materials
Optimization of Energy Resources



Mathematical,
Computational,
Experimental
Methodologies
And Tools

Microscopies (Optical, PET, Neutron, X-Ray, ..)
Analytical and Mathematical Models
Biosensors





MPS is Natural Partner

Disciplinary Programs in Four Divisions:

- Chemistry of Life Processes - CHE
- Biomaterials – DMR
- Mathematical Biology - DMS
- Physics of Living Systems – PHY

Over two decades of disciplinary MPS – BIO interactions (convergence):

- NSF 03-045 “Interdisciplinary CAREER proposals in the molecular biosciences and the physical and mathematical sciences”, MPS+MCB, (5 years),
- BIOMaPS – Budget initiative FY 2011 - FY 2015
- Numerous Co-Funds (Program-Program, INSPIRE, RAISE)
- Partnership in Physics Frontiers Centers (3 Centers)
- Partnership in NSF-Simons Centers (4 Centers)

Plus Broader Initiatives:

- National Nanoscale Initiative – FY 2001-FY2005 – Mainstreamed
- Understanding the Brain – Part of BRAIN initiative – Ongoing
- Collaborative Research in Computational Neuroscience (CRCNS)

