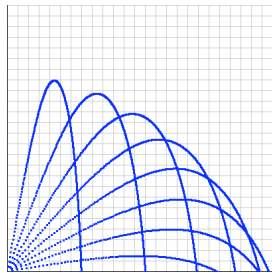
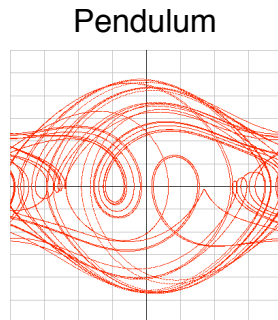


An Open-Source Lab Manual for Computational Physics Using Java

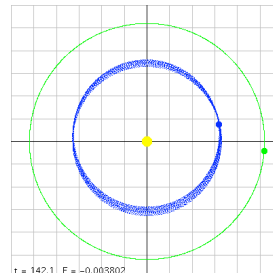
Dan Schroeder, Weber State University, <http://physics.weber.edu/schroeder/javacourse>



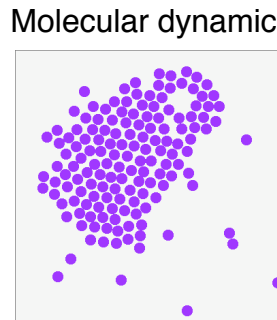
Projectile motion



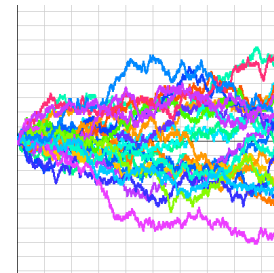
Pendulum



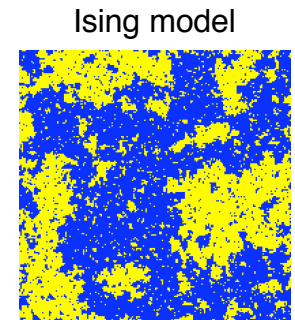
Orbits



Molecular dynamics



Random processes



Ising model

Course Goals

- Learn enough Java to write simulations
- Learn a few numerical algorithms
- Better understand Newton's laws
- Explore complex systems and emergent phenomena
- Learn by doing--not by listening to lectures
- Have fun

Lab Manual Features

- Projects are adapted (i.e., stolen) from Gould & Tobochnik, Giordano
- Gives detailed instructions and code fragments--not complete programs
- Self-contained--no textbook or software manuals needed
- Starts with "Hello, world!" and assumes no programming experience
- Prerequisites: one semester each of physics and calculus
- Glossary, API summary, bibliography, quick reference sheet
- Short enough to read: only 118 pages

What's Not Covered

- Half of the Java language
- 99% of Java's 3000 built-in classes
- Sophisticated add-on packages (like OSP)
- How to create applets or double-clickable applications
- Managing large software projects
- In-depth numerical analysis, nonlinear dynamics, phase transformations, etc.