Pacific Northwest Association for College Physics
Thirty Seventh Conference
Lewis and Clark College, Portland, Oregon
Abstracts

10:10-10:25 AM Friday, April 7, 2000

Chaos and the Correspondence Principle

Brian Watkins, Department of Physics, Washington State University, Pullman, WA 99164-2814, bwatkins@wsunix.wsu.edu

Semiclassical physics approximates solutions to quantum systems by using information related to the classical trajectories of the quantum system's classical analog. It is well--suited for describing mesoscopic systems: systems large enough that quantum descriptions would be too burdensome, and small enough where classical descriptions fundamentally cannot describe some of the most interesting physical phenomena. This talk will present some aspects of the motivation and history of semiclassical physics. The stadium billiard, a paradigm of chaos, will be used to illustrate newly emerging methods in which classical information can be combined to create a semiclassical approximation.

2:00-2:15 PM Friday, April 7, 2000

Have We Forgotten the Forgotten Fundamentals?

Toby Dittrich, Department of Physical Science, Portland Community College, Portland, OR, 97219, tdittric@pcc.edu

Abstract: The "1973 Energy Crisis" brought out public interest in energy and courses on this subject at many of our colleges. Since then this subject has been discarded and public interest has shifted to the question of the cost of gasoline. This talk is an effort to revitalize our interest and efforts to include energy education in our standard "chapter 6" curriculum. Has the looming "world energy crisis" finally arrived?

3:45-4:45 PM Friday, April 7, 2000

BEFORE THE BIG BANG

Edward (Rocky) Kolb, Fermi National Accelerator Laboratory, Batavia, IL 60510, rocky@rigoletto.fnal.gov

Thirteen billion years ago our universe started with a bang. Today we are gathering the fossil evidence of the very earliest moments of the universe. Our picture of the very beginning of the universe is still incomplete, with outstanding questions like

What powered the big bang?
What is the dark matter that binds together the universe?
What is the dark energy that thrusts apart the universe?
Are there hidden spacetime dimensions?
What was before the big bang?

Most science lectures talk about what we know. In "Before the Big Bang" I will talk about what we don't know; the questions I think about while in the shower, stuck in traffic, and during boring faculty meetings.

8:00 PM, Friday, April 7, 2000

THE PHYSICS OF WATER

Michael Broide, Physics Department, Lewis and Clark College, Portland, OR 97219, broide@lclark.edu

Water, the most abundant liquid on Earth, is also one of the most unusual. Its intricate network of hydrogen-bonded molecules results in many anomalous properties, including the hydrophobic effect, water's high surface tension, and the fact that ice floats. On a molecular level, water plays a key role in shaping the structure of proteins and membranes. Likewise, the evolution of plants and animals is dictated by water's physical properties, providing both opportunities (a bug can walk on water) and constraints (but not if it's too heavy). These and other illustrations of water's legacy are discussed.

9:00 - 9:15 AM Saturday, April 7, 2000

Chance, Determinism, Complexity, and Meaning in Science: A General Education Course in Science with Chaos Theory as its Theme

Thomas Olsen, Department of Physics, Lewis and Clark College, Portland, OR 97219, olsen@lclark.edu

I report on a course that I have been teaching for the last two summers at Lewis & Clark College. Students find the theme of Chaos engaging, and it motivates studies in probability, mechanics, radioactivity, and numerical simulation. The course attempts to make reasonable connections to larger issues, with readings from LaPlace, Popper, Prigogine, and Polkinghorne. Students are given opportunities to respond in laboratory exercises, quantitative calculations, computer graphics, and descriptive prose. Initial response to the course has been positive.

2:00-2:15 PM Saturday, March 28, 1998