This poster is an update on the Animations for Introductory Physics and Astronomy project at Penn State Schuylkill. This project was initiated to help students visualize aspects of 3-dimensional situations where traditional static drawings were seen as inadequate. The animations have been used to portray a wide variety of dynamical systems and processes for physics and astronomy topics typically presented in the advanced high school through introductory college level.

Abstract

New Animations: Mechanics

Motion in inertial versus non-inertial reference frames is illustrated in a series of merry-go-round animations and culminates in a depiction of the Coriolis effect on the earth.

Cubic and Spherical 3-D Modes of Oscillation

New Animations: Electromagnetism

The forces on the current elements comprising a current loop are illustrated in the first animation, while the second expands on the concept showing a DC motor complete with commutator.

Progression From 3 Single Coils to a Toroidal Solenoid

New Animations: Optics

The first animation shows the diffraction limit on the resolution of two point sources. The second two animations show how the limiting diffraction effects depend upon aperture and wavelength.

A hypothetical propulsion mechanism for radio galaxy jets is illustrated in the first animation, while the second focuses on the anatomy of an active galactic nuclei (accretion disk, dust torus, jet). The third animation is a simple illustration of the geometric cause of seasons on Earth.

New Animations: Astronomy

A Bit of Fantasy: a Ringworld Flyby

These frames are from an animation depicting interacting binary stars, complete with Roche Lobes and mass transfer.

The Geometry of Orbital Elements

Artificial Video Data: The Millikan Oil Drop Experiment

Artificial video of oil drops analyzed with Doug Brown's Tracker applet

Sample data illustrating quantization of charge.

Assessment

Student Surveys from Conceptual Astronomy (Spring 07):