

Session AAPT: AAPT Posters

Chair: George Alverson, Northeastern University
Curry Student Center - Ballroom

AATP.01 New Ideas for Teaching Relativity (with Spacetime Diagrams)

Rob Salgado (Department of Physics, Mount Holyoke College)

We present two new approaches for teaching relativity with Minkowski Spacetime Diagrams. The first approach uses a new animated visualization of the proper-time elapsed along an observer's worldline (as demonstrated in my contributed talk at this meeting). The second approach presents a unified formalism for two-dimensional Euclidean space, Galilean spacetime, and Minkowski spacetime as Cayley-Klein geometries. Inspired by Yaglom and Taylor & Wheeler, we use familiar techniques from the analytic geometry and trigonometry of Euclidean space to develop the corresponding analogues for Galilean and Minkowski spacetimes and immediately provide them with physical interpretations. Upon defining a "unit circle", we define the notions of "angle", "circular functions", and related constructions [including visualizations of tensor algebra]. A feature of this unified formalism is the ability to clarify the analogies among the three geometries, especially the Galilean limits of Minkowskian results. In addition, the formalism has a natural extension to the deSitter spacetimes of general relativity. Although many of the facts presented here are known, they are scattered throughout the physics and mathematics literature, often with little reference to a common framework that is useful for the teaching of relativity.

AATP.02 The Appearance and the Interplanetary Effects of a Steeply Inclined Solar Magnetic Equator

Gary Parker (Department of Physics, Norwich University)

The Sun's magnetic and rotational equators nearly coincide when sunspots are absent. But near the peak of the 11-year sunspot cycle, the magnetic equator is steeply tipped. Throughout the cycle, long rays seen in white light are a dominant feature of the solar corona. The most persistent ray during the last cycle, as seen by a coronagraph aboard the Solar Heliospheric Observatory (SOHO), marked the northernmost excursion of the magnetic equator even as it repeatedly rotated into a position beneath the Ulysses spacecraft when Ulysses was at high latitude. The solar wind response to the high latitude magnetic equator is described and discussed.