Teaching Physics in a Space Science Context

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Project Overview

• AAPT is a partner in the NASA Heliophysics Education Activation Team (HEAT). This 5-year initiative from NASA leads the development of research-based instructional materials for astrophysics taught in the context of introductory and upper division physics and astronomy courses.
• All materials are developed through educational research in our own classrooms and are small-scale and modular, designed to fit into and enhance existing physics and astronomy courses.
• This team has expertise in astronomy and physics education research, heliophysics content, and access to post-secondary classrooms to field test all materials.

Thematic Focus: Heliophysics

• The resources support concept development associated with heliophysics.
  • Motion: velocity & acceleration of coronal mass ejections.
  • Periodic Phenomena and Patterns: period and frequency of sunspot activity.
  • Electromagnetism: Analyze three-dimensional solar magnetic field data and estimate induced electric fields.
  • Modern Physics: accelerations of relativistic particles ejected by the Sun.

Available Resources

Lecture Tutorial
Use time-marked image sets to plot x-t and v-t graphs for coronal mass ejections (CMEs), and describe their changes in motion.

Lecture Tutorial
Calculate period and frequency of various solar patterns, including sunspot frequency and location.

Lecture Tutorial
Use data from intermagnet.org to make inferences about auroral currents.

Lecture Tutorial
Use time-marked image sets to estimate the moment of acceleration of relativistic particles from the Sun before colliding with the Earth’s atmosphere.

NASA HEAT Space Physics Ambassadors

NASA HEAT Space Physics Ambassadors are available to provide support in the use of these materials through virtual (and sometimes in-person) workshops around the U.S.

2023
• Jason Barbour (Maryland)
• Emily Bogusch (Arizona)
• NivediDas (Massachusetts)
• Jarrod Gorman (Massachusetts)
• Tony Musumba (California)
• Brenda Paul (Georgia)
• Kevin Simmons (Florida)
• Hava Turkakin (New York)

2022
• Christine Bernhardt (DC)
• Ed Izaguirre (California)
• Rod Milbrandt (Minnesota)
• Steven Montoya (Arizona)
• Fana Mulu-Moore (Colorado)
• Gaea Sawan (Texas)
• Ronald Schlaack (Michigan)
• Liang Zeng (Texas)

Monthly Workshop Series

MONTHLY WORKSHOP SERIES: “Physics in an Astronomy Context”

• Virtual gatherings of 25-50 teachers, one Saturday of each month
• Each session consists of the following:
  • Astrophysics mini-lecture
  • Small group engagement with the core activity
  • Exploration and whole group discussion time
• Sign up for individual sessions and learn more at shorturl.at/jprZ2

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