

UATP

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Hosts

Dept of Physics & Astronomy & the
Center for Astronomy Education,
U of Nebraska-Lincoln

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Education, U Arizona

PROSPECTUS

The workshop will emphasize materials and strategies that facilitate, enhance, and inspire the use of astronomy, astrophysics, and space science to enrich the content and teaching of undergraduate physics courses.

Examples:

1. **Textbooks** with strong astronomy themes, e.g.
 - a. Traditional introductory university physics with many applications of mechanics illustrated with example from astronomy and space science [Amato]
 - b. Syllabus to teach physics needed to understand the Astronomy 2010 Decadal Study and its report *New Worlds, New Horizons: In astronomy and astrophysics*.
 - c. Build a physics syllabus using astronomy and space science materials available on the web. Identify areas and topics for further development.
2. **Problems** suitable for homework and exploration Collect, compile, and publish them on the web (ComPADRE). Identify useful new problems and volunteers to develop them.
Many problems already exist, e.g.
 - a. Keplerian orbits of stars around Galactic Center
 - b. extinction curves of exoplanets
 - c. light curves and Doppler signals from binary systems
 - d. evidence for dark matter: failure of $1/r^2$
 - e. nuclear properties basic to stellar processes
3. **Technology modules:** Instructional material based on advanced astronomy and space science technologies, e.g.
 - a. MMT(Multi-mirror telescope),
 - b. ALMA (Atacama Large Millimeter/submillimeter Array)
 - c. Kepler
 - d. Chandra, Fermi
 - e. detectors for IR
 - f. detectors for x-rays, gamma rays
4. **New modes of astronomy:** Develop material about novel astronomies, e.g.
 - a. LIGO, LISA – gravitational radiation
 - b. Pierre Auger Observatory – high energy cosmic rays [Greg Snow]
 - c. Amanda, ICE Cube – neutrinos
5. **Lab experiences** for physics teachers and students –Identify existing virtual and real hands-on experiences; plan how they can be adapted to physics instruction; organize volunteers to do the adaptations & trials, e.g.
 - a. CMB
 - b. Detectors
 - c. Finding exo planets [?]
 - d. IRAF Lite [Richard Gelderman]
 - e. Doppler
 - f. parallax ... etc.



Using Astronomy to Teach Physics



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