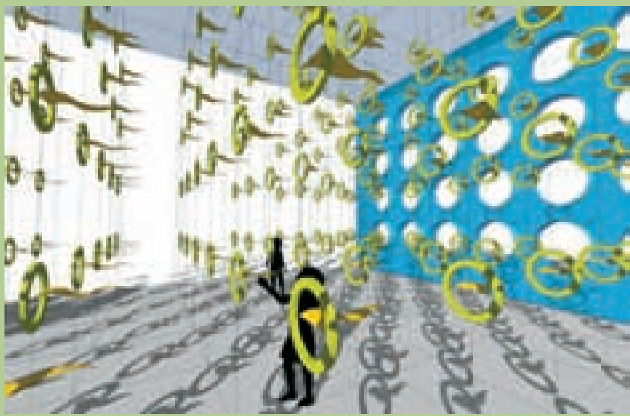


Phoebe's Field project lets kids handle scientific concepts

An international team of educators and professionals based at Virginia Tech is working on giving middle-schoolers innovative ways to learn scientific concepts, such as electromagnetic and acoustic fields. Their goal is to encourage interest in science among children, especially girls. ECE faculty member Steve Ellingson is part of the team, which is led by Mitzi Vernon of the School of Architecture and Design and includes eight other collaborators.

The effort, which includes a children's book and a traveling exhibition, is called Phoebe's Field and is targeted especially for girls, who often lose interest in science at adolescence.

The exhibition will use metaphors in nature to explain complex concepts, such as electromagnetism. As they tour the exhibition, students see, hear, touch, and carry out physical activities in fields usually beyond their perception. A quest storyline captures the student's attention and focuses their interest in concepts.

Ellingson is contributing to the development of the electromagnetic field exhibit, which deals with the concept of electromagnetic signals such as those found in cell phones. He is also working on an RFID-based system that will allow new forms of interaction between the exhibits and the visitors. Visit: *www.phoebesfield.org*.

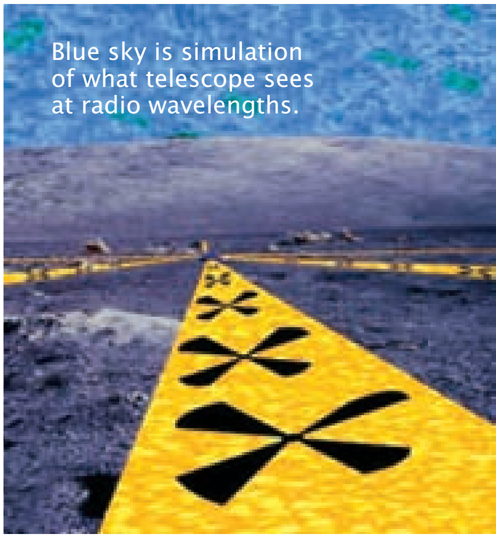
DALI on the dark side

Astronomers have long dreamed about putting telescopes on the far side of the moon, away from Earth's turbulent ionosphere and torrent of radio signals. In the moon's radio-free shadow, radio telescopes might possibly pick up faint signals from the early universe that could not be otherwise detected.

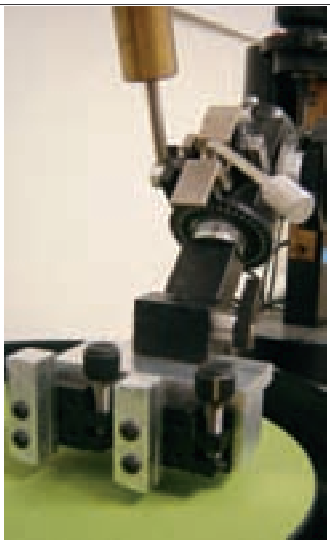
ECE's Steve Ellingson is part of a Naval Research Laboratory team fleshing out ideas for rolled-up radio antennas that would pop open after being dropped on the lunar surface for transmitting data and for taking advantage of the planned presence of astronauts on the moon around 2019.

The team wants to build radio telescopes (antennas) that can capture signals at the very long wavelengths generated by events that occurred within hundreds of thousands — as opposed to billions — of years after the big bang. The universe consisted then of still-dark matter, hydrogen and helium. Efforts to test theories about the Universe's origins would benefit from the kind of data a moon-based radio telescope could provide.

The team, which includes researchers from Berkeley, the University of Colorado, Harvard, and Yale, is working under a $500,000 NASA-funded planning grant as part of the Dark Ages Lunar Interferometer (DALI) project. The team has recently merged with a similar effort led by MIT. The Dark Ages refers to the time after the initial universe explosion and before stars and galaxies formed.



An artist's conception of one of the antenna arrays comprising the radio telescope. The antennas are printed on a thin material which is rolled out from a central electronics hub that contains receivers and communication gear.



.1 micron precision

When the measurable difference between two equal fiber path lengths in a fiber coupler could not exceed 5 micrometers, researchers in the Center for Photonics Technology designed a new polishing technique.

Bradley Fellow Evan Lally and undergraduate Tyler Shillig have been working on a special white-light interferometry technique to monitor the exact optical path length difference between two coupler arms. The two lengths of fiber are placed in a precision adjustable polishing jig, and their lengths are monitored as the fiber tips are ground down.

The team reports they expect their polishing system to achieve 0.1 micron path length equalization.

Having a fiber coupler with exactly equal length output arms is critical to the operation of a system they are developing to image small rock and sand particles in asphalt. The project is sponsored by the National Cooperative Highway Research Program.