Dr. Tom Troland

Astronomer

University of Kentucky

Research Specialty: Star Formation

Comfortable with the following age ranges: all

Comfortable with the following audience sizes: all

Dr. Tom Troland is an astronomer at the University of Kentucky. He teaches astronomy to university students, and he often visits school classrooms in his community to talk about astronomy. Also, he studies how stars form out of giant clouds of gas and dust in space. Although stars are very hot, they form from clouds that are very cold. So the clouds emit no light, and they cannot be studied with ordinary telescopes. Instead, Dr. Troland studies star-forming clouds with giant radio telescopes. The largest one he uses is as big as 20 football fields, and it looks like a giant bowl in the ground on the island of Puerto Rico. Astronomers now realize that many stars formed long ago. But new stars are still forming today. With radio telescopes, astronomers can see this process in action. So we can better understand how the Sun and planets formed billions of years ago.

Presentation Overviews and AV Requirements:

Classroom Visit presentations

Journey Through the Solar System **Grades: 3-6**

Modern spacecraft have provided with astonishingly detailed images of many objects in the solar system. These images tell us much about all planets except Pluto, and about many of the moons of these planets. What would it be like to stand on the surface of Mars? How would it be different from standing on the surface of Earth? What would it be like to be on the surface of Venus or to witness the volcanoes of Jupiter's moon Io? In this presentation, students will journey to several interesting abodes in the solar system, swinging around the Sun for a close-up look first. In the process, they will see that some things on these other worlds are like things on the Earth. But many, of course, are not.

AV Requirements: LCD projector, projection screen, and extension cord

What's Up in the Universe? **Grades: K-12**

The universe is *everything*—all the matter, all the space and all the energy that exists everywhere. But how is matter arranged? How big are things in the universe? What happens when objects in the universe collide with each other? Beginning with the solar system, we will progress out to the largest known systems of matter in the universe—superclusters of galaxies. Along the way, we will use ping-pong balls to help visualize these things and their sizes. We will learn, for example, why stars almost never collide, but galaxies often do so, with spectacular results.

AV Requirements: LCD projector, projection screen, and extension cord

The Time Machine of Astronomy **Grades: 6-12**

H. G. Wells wrote *The Time Machine*, and he envisioned a device that could take us back to earlier epochs of history. Astronomers have such a time machine—the travel time of light through the universe. When astronomers look at very distant objects, they see them as they were a very long time ago. The time machine in astronomy tells us much about the nature of the universe when it was billions of years younger than it is today.

AV Requirements: LCD projector, projection screen, and extension cord

A Journey to the World's Largest Telescope **Grades: K-12**

The Arecibo radio telescope, located on the island of Puerto Rico, is the largest telescope in the world. In fact, it is larger than all other telescopes combined. This telescope consists of a metal bowl 1,000 feet in diameter. It functions something like a satellite dish on a giant scale. What is it like to visit this telescope? What is it like to stand 500 feet above its surface? What is it like to walk beneath the surface among a forest of ferns that hold the soil against the erosion of tropical rain?

AV Requirements: LCD projector, projection screen, and extension cord

<u>Family Science Nights</u>

A Journey to the Outer Planets

What would it be like to stand and walk on the surface of Mars? What would you see if you could fly close to the giant planet Jupiter, swooping close to its swirling clouds and right past its exotic moons? What would it be like to swing past Saturn and see its rings up close? Spectacular images from NASA's spacecraft now provide the answers. Until very recently, such a journey could only be imagined in the minds of astronomers, artists and science fiction enthusiasts. Now we know what such a journey would really be like.

AV Requirements: LCD projector, projection screen, extension cord, and lavaliere microphone

Thomas H. Troland
Formal Bio

Education

B.A.	Amherst College, 1970
M.A.	University of California, Berkeley, 1974
Ph.D.	University of California, Berkeley, 1980

Employment

1974-1980	Instructor of Astronomy, City College of San Francisco
1977-1980	Research Astronomer, University of California, Berkeley
1981-1985	Assistant Professor of Astronomy, University of Kentucky
1986-1997	Associate Professor of Astronomy, University of Kentucky
1997-	Professor of Astronomy, University of Kentucky

Research activities

- Radio astronomy
- Interstellar material
- Star formation
- Interstellar magnetic fields

Professional societies

- American Astronomical Society
- International Astronomical Union
- Sigma Xi

Recent Publications (refereed and invited)

- "Detection of CN Zeeman Effects in Molecular Clouds", R. M. Crutcher, T. H. Troland, B. Lazareff, G. Paubert, and I. Kazes, ApJ, 514, 121 (1999).
- "The Magnetic Field of the NGC 2024 Molecular Cloud", R. M. Crutcher, D. A. Roberts, T. H. Troland & W. M. Goss, ApJ, 515, 275 (1999).
- "Detection of Magnetic Fields toward M17 through the HI Zeeman Effect", C. L. Brogan, T. H. Troland, D. A. Roberts & R. M. Crutcher, ApJ, 515, 304 (1999).
- "Aperture Synthesis Studies of the Magnetic Field in Star-Forming Regions", T. H. Troland in The Physics and Chemistry of the Interstellar Medium, ed. V. Ossenkopf (Herdecke: GCA Verlag), p. 253 (1999).
- "VLA OH and HI Zeeman Observations of the NGC 6334 Complex", A. P. Sarma, T. H. Troland, D. A. Roberts & R. M. Crutcher, ApJ, 533, 271 (2000).
- "OH Zeeman Magnetic Field Detections Toward Five Supernova Remnants Using the VLA", C. L. Brogan, D. A. Frail, W. M. Goss & T. H. Troland, ApJ, 537, 875 (2000).
- "OH Zeeman Measurement of the Magnetic Field in the L1554 Core", R. M. Crutcher & T. H. Troland, ApJ, 537, L139 (2000).
- "VLA HI Zeeman Observations Toward the W49 Complex", C. L. Brogan & T. H. Troland, ApJ, 550, 799 (2001).
- "Very Long Baseline Array Observations of the Zeeman Effect in H_2O Masers in W3 IRS 5", Sarma, A. P., Troland, T. H. & Romney, J. D. , ApJ, 554, L217 (2001).
- "VLA H I and OH Zeeman Observations toward M17", Brogan, C. L. & Troland, T. H., ApJ, 560, 821 (2001).
- VLA HI Zeeman Effect Observations of Centaurus A", A. P. Sarma, T. H. Troland & M. P. Rupen, ApJ, 564, 696 (2002).
- "Global VLBI Observations of the High-Velocity HI Absorption toward NGC 1275", Momjian, E., Romney, J.D., and Troland, T. H., ApJ, 566, 195 (2002).
- Magnetic Fields in Shocked regions – VLA Observations of H_2O masers", Sarma, A. P., Troland, T. H., Crutcher, R. M., and Roberts, D. A., ApJ (accepted for publication).

- “The Millennuim Arecibo 21-cm Absorption line Survey. I. Techniques and Gaussian Fits”, Heiles, C., & Troland, T. H., ApJ (accepted for publication)
- “The Millennuim Arecibo 21-cm Absorption line Survey. II. Properties of the Warm and Cold Neutral Media”, Heiles, C., & Troland, T. H., ApJ (accepted for publication)
- “VLBA Continuum and H I Absorption Observations of the Ultra-Luminous Infrared Galaxy IRAS 17208—0014”, E. Momjian, J. D. Romney, C. L. Carilli, T. H. Troland, and G. B. Taylor, ApJ (submitted for publication).
- “The Millennuim Arecibo 21-cm Absorption line Survey. III. Techniques for Spectral Polarization ”, Heiles, C., & Troland, T. H., ApJ (to be submitted for publication in November, 2002).