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faculty interview: physics

Dr. Perry Gerakines: Astrophysicist at UAB Investigates the Origins of Life

Physics, Danuel Laan



Flight Center in Greenbelt, Maryland. UAB's preexisting astrophysics lab was one of the incentives for Dr. Gerakines to join the staff.

Dr. Gerakines' research mainly involves materials found in space either in interstellar clouds, cold dark clouds found between stars, or materials found on the icy surfaces of some planets and planetary moons in our solar system.

Some of these moons experience freezing temperatures as low as 10 degrees Kelvin, close to absolute zero, the coldest temperature known. On the surface of these celestial bodies, there are ice-chemical matrices that are of particular interest to him. Dr. Gerakines studies the spectroscopy of these materials in order to see absorption patterns with infrared energy changes associated with physical properties such



We want to understand what the Saturn system is made of because we want to understand the history of our solar system. The chemistry that has gone on around Saturn is a lot different than what has gone on around earth. Understanding the origins of the materials on these moons tells us about the origin of Saturn and the origin of the universe.

As a child, Perry Gerakines was an avid reader of science fiction. Today, he performs the very research that could change science fiction into real technology. He began his career as a high school senior when he was selected to take part in a course at Harvard University. The Nobel Prize winning physicist, Roy Glauber, was his teacher. His first research endeavor was as a sophomore in a Research Experience for Undergraduates (REU) program over the summer of 1991 at the Rensselaer Polytechnic Institute (RPI) in Troy, New York. There he developed an interest in infrared astronomy, a field of astrophysics that analyzes celestial bodies through infrared light to determine structural and functional properties. He carried over his interest in astrophysics to graduate school where he obtained a two-year research degree (M.S.) in Astronomy at Leiden University in the Netherlands. He believes his experience in the Netherlands was invaluable to him as it broadened his perspective and gave him experience in the global science community. He returned to RPI to obtain a Ph.D. in Physics. Before he came to the University of Alabama at Birmingham (UAB), he was a Postdoctoral Research Associate for the National Research Council and the National Academy of Sciences at NASA's Goddard Space

as cold temperatures, crystalline state, chemicals within the ice, or radiation acting on the ice. The goal of his research is to interpret observations made from space by instruments such as the Spitzer Space Telescope, which records infrared spectroscopies of icy celestial bodies or interstellar clouds and sends these absorptions spectrums back for analysis.

In recent months Dr. Gerakines was awarded a three-year, \$408,000 grant for the project, "Vacuum Ultraviolet Spectroscopy of Icy Mixtures Relevant to the Outer Solar System." Gerakines will work with Amanda Hendrix, a Cassini UVIS instrument scientist from the Jet Propulsion Laboratory, to measure the vacuum ultraviolet spectra of thin ice films. This research is part of a larger NASA Outer Planets Research Program and studies the composition of Titan and Enceladus, two of the 52 moons orbiting Saturn. The Cassini mission is a very large space probe that NASA sent to Saturn to analyze

the icy moons that surround Saturn through the ultraviolet spectrum of light. Gerakines will be doing laboratory measurements of what is expected on the surfaces of these planets and then comparing these measurements with the real data as it comes in. Dr. Gerakines says, “We want to understand

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He realizes that undergraduates need experience in a specialty to see if it is the best fit for their talents. He also encourages students to explore multiple disciplines and find something that truly excites their interest.

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In this endeavor, Dr. Gerakines hopes to derive a basic understanding of materials under these extreme conditions. Even though some compounds such as water or carbon dioxide might seem well studied or understood under terrestrial conditions, very little is known about their behavior under extreme conditions such as in the vacuum of space or temperature as low as ten degrees above absolute zero. His research, then, could very well be crucial in the origins of the organic materials present in comets and meteorites or the molecular origins of life itself.

Three graduate students collaborate with Dr. Gerakines in his current research. In addition, every summer undergraduate students assist him in his lab. He is very receptive to students and advises all undergraduates to find a researcher in their particular field of interest and shadow them. He believes that this experience is imperative and clarifies a student's understanding of their potential field while allowing them to truly see if the field is right for them. He says, “Undergraduates that don't have lab or research experience have this idea of