SPACE AND COSMIC RAY PHYSICS SEMINAR

University of Maryland
Computer & Space Sciences Building, Rm 2400
4:30 PM Monday, November 17, 2003
Tea & cookies 4:00-4:30 PM

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Laboratory Chemical Research Applied to the Atmospheres of the Outer Planets

The Outer Planets (Jupiter, Uranus, and Neptune) and the Saturnian moon, Titan, present in their atmospheres the opportunity to study different chemical and physical systems as compared to the atmosphere of the Earth. The Outer Planetary atmospheres surround considerably larger bodies, are colder, receive much less sunlight, reach higher pressures at the surface and are reducing. The chemical understanding of these atmospheres requires interplay among observations, photochemical models, and laboratory measurements of fundamental parameters.

Almost all of the Outer Planetary atmospheric observations of the chemical species, temperatures and pressures are remote from spacecraft or the ground. The Galileo spacecraft sent one probe into the atmosphere of Jupiter, and next year the Cassini spacecraft will send a probe into the atmosphere of Titan. So the chemical photographs of these bodies are partial snapshots. Photochemical models not only try to understand the atmospheric chemistry which produces the species seen in the observations but also tries to fill in the holes in the snapshots. Both the interpretations of the observations and the photochemical models rely upon laboratory chemical research, especially in the areas of photochemistry and chemical kinetics.

This talk will give an overview of the chemistry, especially hydrocarbon chemistry, of the Outer Planetary atmospheres and then discuss several laboratory studies we have recently finished. The rate constant for the recombination of methyl radicals was measured to help resolve the discrepancy in methyl radical column density between observations and photochemical models of the atmospheres of Saturn and Neptune. The rate constant for the reaction of hydrogen atoms with cyanoacetylene was measured for the first time for the atmosphere of the Saturnian moon Titan, where there is a discrepancy between the results of observations and photochemical models. Our experimental apparatus is fast flow tube, which is combined with mass spectrometric detection.

Sponsored by: Department of Physics, University of Maryland, and the Institute for Physical Science and Technology, University of Maryland. For information call Matthew Hill at (301) 405-6209 or go to the following website:
http://space.umd.edu/seminars/Fall_2003_Seminar.html (A PDF file of this abstract is available for download at this URL.)

For free parking please park in lot DD or anywhere on levels 1-2 in lot B (the big parking garage) after 4.00 pm. Make sure that you park in a spot WITHOUT a parking meter.