Physical Chemistry Seminar

Tuesday, November 10, 2009 | **11:00 a.m.** | **Room 1315 Chemistry Building**

Astrochemistry: From H_3^+ to C_{60}

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Our galaxy's interstellar medium contains roughly 10^{16} more molecules than the Earth, and nearly 150 different interstellar molecules have been definitively identified by high resolution spectroscopy. However, our inventory of this vast chemical repository remains very incomplete, and our understanding of the chemical and physical processes that produce and destroy these molecules remains primitive. Our group is engaged in an interdisciplinary program of laboratory experiments and astronomical observations aimed at answering some of the key unsolved questions in "astrochemistry." In this talk, I will describe how our observations of H_3^+ (the simplest polyatomic molecule) have revealed the presence of a large flux of low energy cosmic rays in diffuse interstellar clouds, and how our laboratory measurements of the most common bimolecular reaction in the universe ($H_3^+ + H_2 \rightarrow H_2 + H_3^+$) have explained the *ortho:para* ratio of H_3^+ in these clouds. I will also describe our development of a new laboratory technique that will ultimately enable the astronomical detection of more complex molecular ions. Finally, I will report on our search for the first rotationally-resolved spectrum of C_{60}, the largest and most symmetric molecule to be studied with high-resolution spectroscopy.

Refreshments will be available prior to the seminar at 10:45 a.m. outside room 1315

Graduate Students may meet with the speaker at 1:15 p.m. in Room 8305f