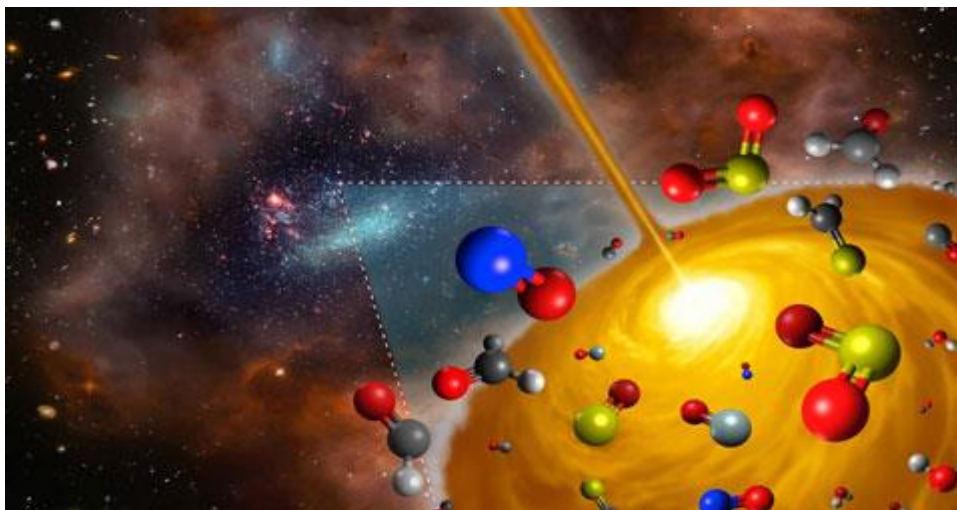




COLLOQUIUM



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Physics of Space, Investigated on Earth: Studying Chemical Reactions in a Laboratory Environment

Abstract

The interstellar medium is filled with a myriad of complex molecules. The chemical reactions that produce this diversity can be studied using terrestrial experiments to empirically measure the reaction rates and products of cold, gas-phase chemical reactions. In addition, these experiments give insight into the fundamental physics of bond breaking and formation. In particular, reactions between molecular ions and neutral molecules are particularly illuminating for understanding and testing theoretical models of gas-phase chemistry. In order to study ion-molecule reactions, we trap ions in a radio frequency ion trap and laser-cooled them to ultracold temperatures with diode lasers. These trapped ions are allowed to react with neutral molecules for a set amount of time, after which a time-of-flight mass spectrometer is used to investigate the identity of the ions in the trap. This talk will discuss the experimental setup and tools used to precisely study these ion-molecule reactions. Some example chemical reactions will also be presented, with an emphasis on why these reactions are important to the understanding of fundamental principles of molecular physics, as well as chemistry in the interstellar medium.

3:00 p.m. – 4:00 pm Friday, April 1st

McLane 162