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Molecular Dynamics of Upper Atmospheric Chemical Reactions

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Abstract: During the period of June 14, 1999 - August 31, 2000, I worked at the Air Force Research Laboratory at Hanscom AFB under the Laboratory Scholar Postdoctoral Program and contract F19621-91-C-0029. In this time, I conducted experiments to investigate the molecular dynamics of chemical reactions that produce visible or infrared radiation in the upper atmosphere. The experiments were performed using laser pump-probe methods and detection techniques such as laser induced fluorescence (LIF) and resonantly enhanced multiphoton ionization (REMPI). The focus of this work was to gain a better understanding of some of the important processes that produce or destroy infrared-active species such as OH and NO in the mesosphere and thermosphere. During this time, I also researched and designed a new set of experiments to investigate the molecular dynamics of the interactions of O(3P) atoms with hydrocarbons. These experiments will be important for understanding how hydrocarbons released by space vehicles traveling through the upper atmosphere will interact with O(3P) atoms, a dominant atmospheric species above 90 km.

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