

Plenary-09

How Novel Algorithms and Access to High Performance Computing Platforms are Enabling Scientific Progress in Atomic and Molecular Physics

Barry I. Schneider

**Applied and Computational Mathematics Division
National Institute of Standards and Technology
Gaithersburg, Maryland, 20899 USA**

The need for efficient computational techniques in atomic and molecular (A&M) physics has become increasingly more critical as the complexity of the problems undertaken by practitioners in the field has grown. This has been especially the case for the accurate treatment of electron and atomic collisions and the interactions of time dependent laser fields with atoms and molecules. A&M physicists, just as their counterparts in other areas of physics, now develop new algorithms and large-scale computer codes to simulate these phenomena in order to obtain results that increase their understanding of these complex processes and enable predictions that would have been impossible without computation. High performance computing platforms are as important to progress in A&M physics today as they have been in condensed matter, elementary particle and astrophysics for many years.

In this talk, I will focus on a few of the most interesting developments that have occurred in recent years in computational A&M physics. While it is impossible to be exhaustive, I hope that the examples will illustrate how the methods that have been developed have broadened the horizons and provided critical insights that would not have come from either theory or experiment on its own.