

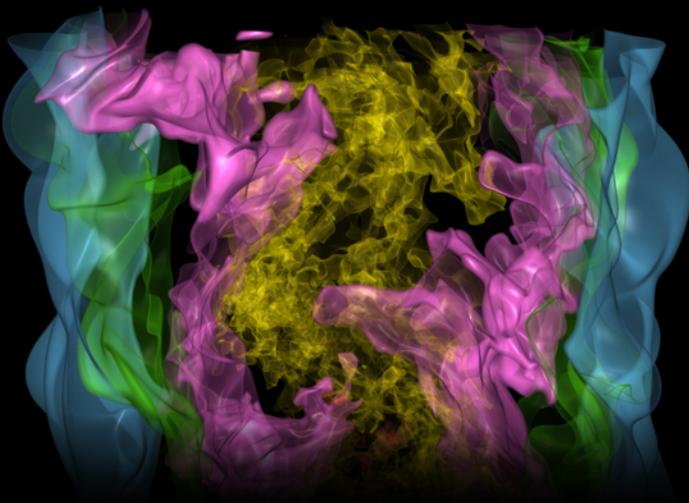
National Center for Computational Sciences

The Leadership Computing Facility (LCF), part of Oak Ridge National Laboratory's National Center for Computational Sciences (NCCS), provides an unparalleled environment for breakthrough science that will dramatically impact the nation's ability to produce a secure energy economy and increase mankind's understanding of our world, from the molecules in the air we breathe to the birth and death of the stars in the sky.



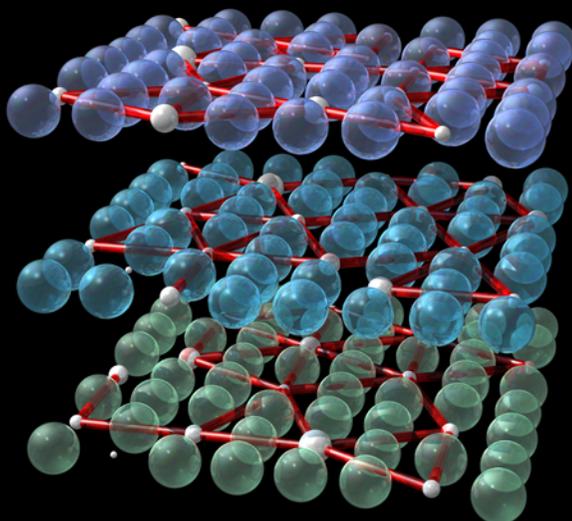
Fusion Energy

NCCS's resources run the world's fastest, most-detailed simulations of heat and particle loss in tokamaks, donut-shaped devices that house the plasma responsible for a fusion reaction. These simulations provide answers for fusion energy projects like ITER, a joint international effort that aims to determine the feasibility of using nuclear fusion as an energy source.



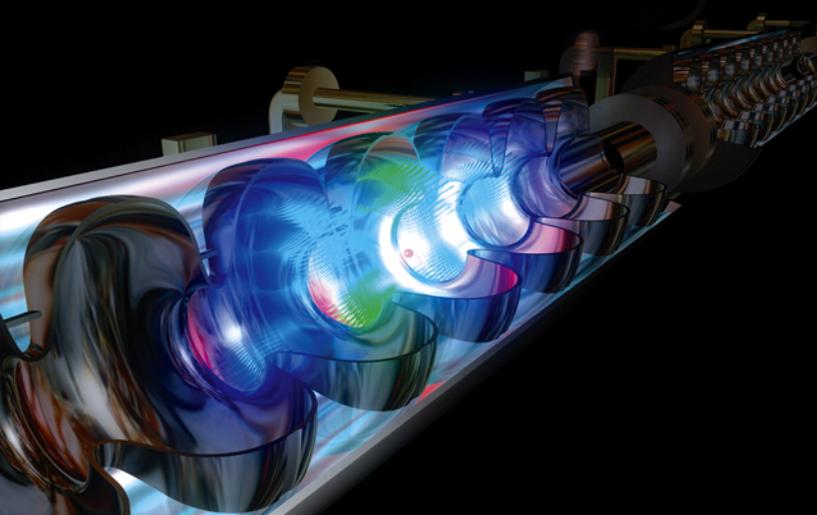
Combustion

Scientists are using the NCCS's immense resources to perform the first 3-D numerical simulations of an ignition flame fed by a fuel-air mix. The goal is a better understanding of several combustion phenomena, which could eventually lead to more fuel-efficient combustion devices.



Materials

Continued progress in creating new materials is the key to advancement in every technological field. Researchers are performing high-power computational simulations at the NCCS to aid the development of classes of advanced materials that will affect daily life in significant ways, such as revolutionizing electrical power systems.



Accelerator Design

Researchers use NCCS's supercomputers to help determine the optimal shape for the accelerator chamber inside the International Linear Collider (ILC). In particular, they are relying on 3-D electromagnetic modeling to design a new low-loss accelerating cavity for the ILC, which is the highest-priority future accelerator project in high-energy physics.