



# Driving Innovation through Federal Investments at the Department of Energy

Presented by Secretary Ernest Moniz

April 29, 2014

# Powering U.S. Defense

UNCLASSIFIED



UNCLASSIFIED

008001503 10-15-07 jse

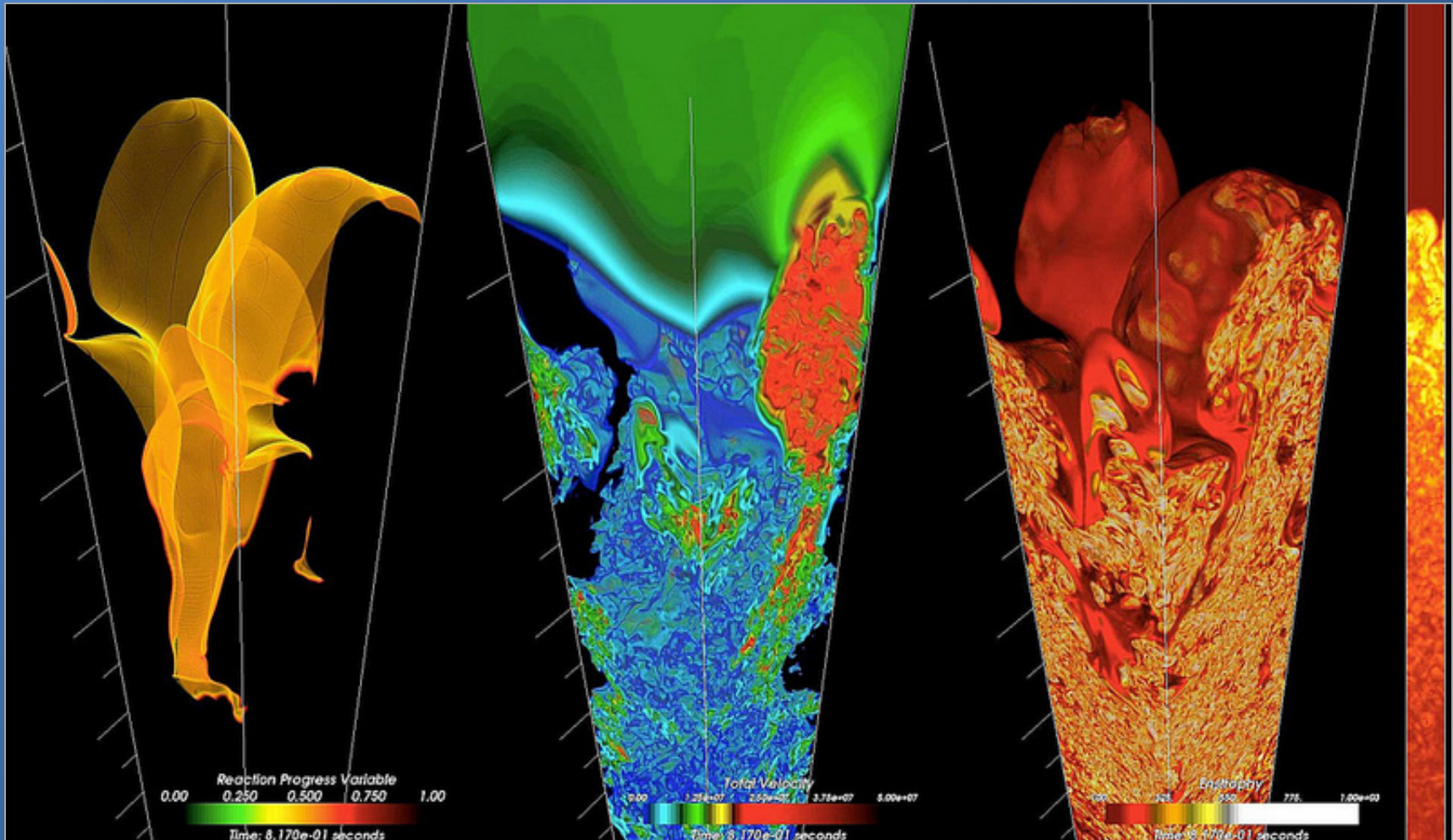
The B61 tactical thermonuclear gravity bomb



USS Nautilus, the world's first nuclear powered submarine (1954)

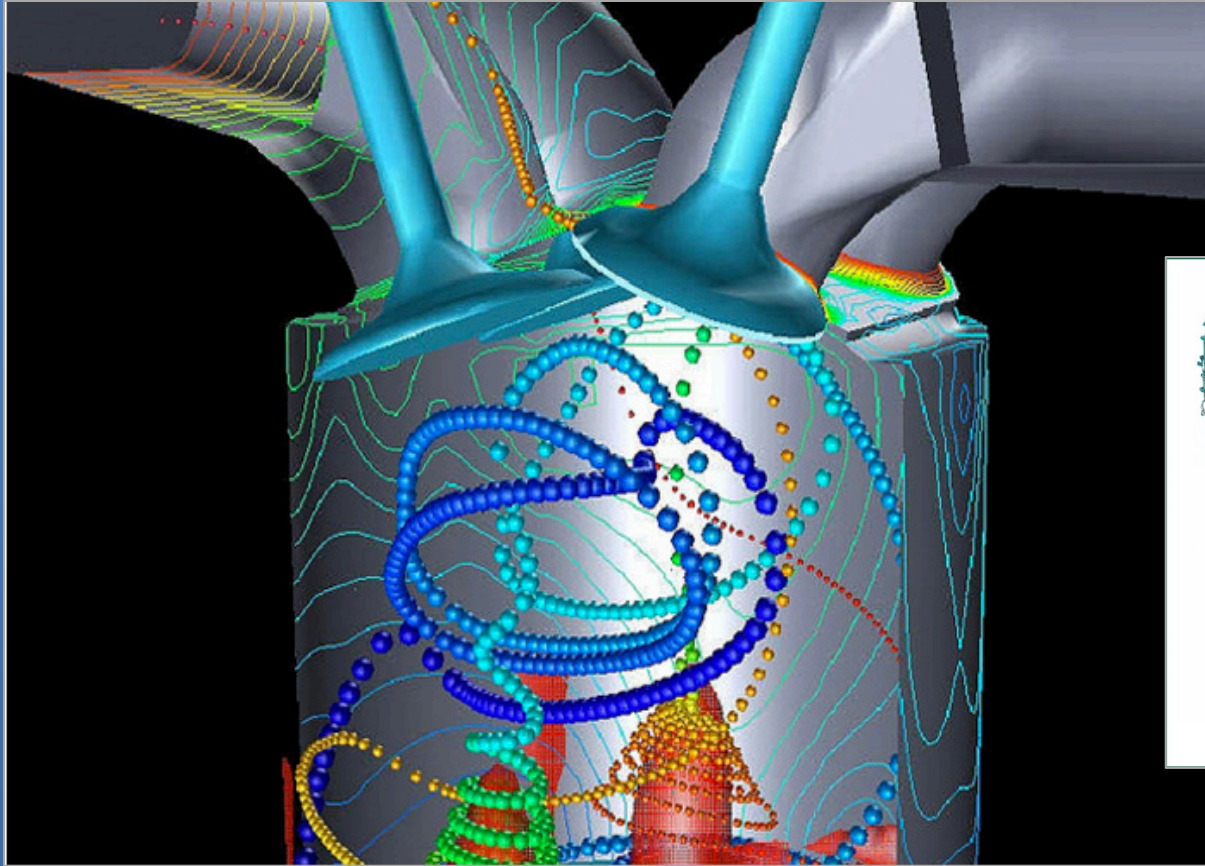
# Core Capabilities

# Supercomputing



Visualizations of a supernova, developed at Argonne National Laboratory

# Supercomputing

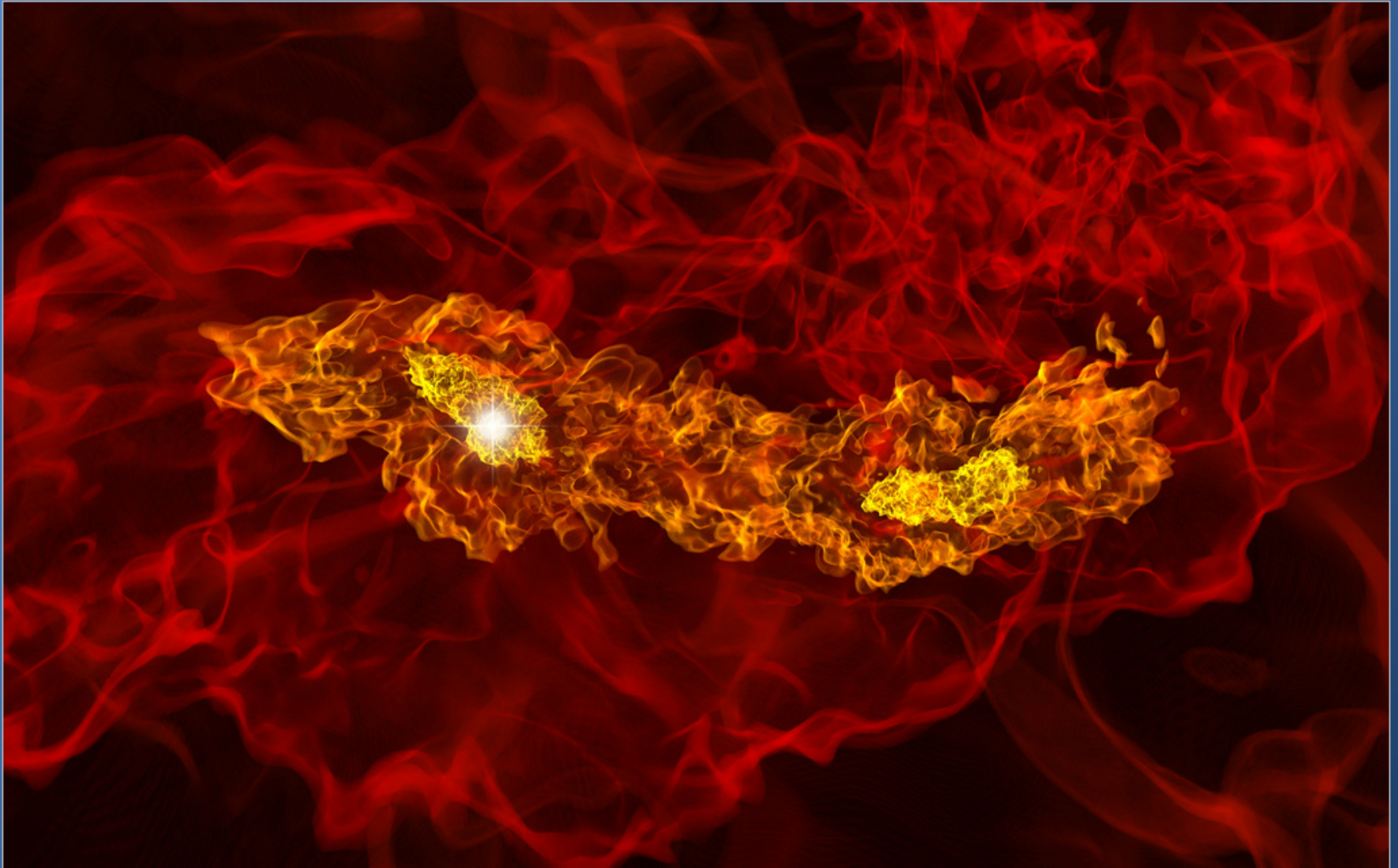


Simulation of internal combustion at Los Alamos National Laboratory



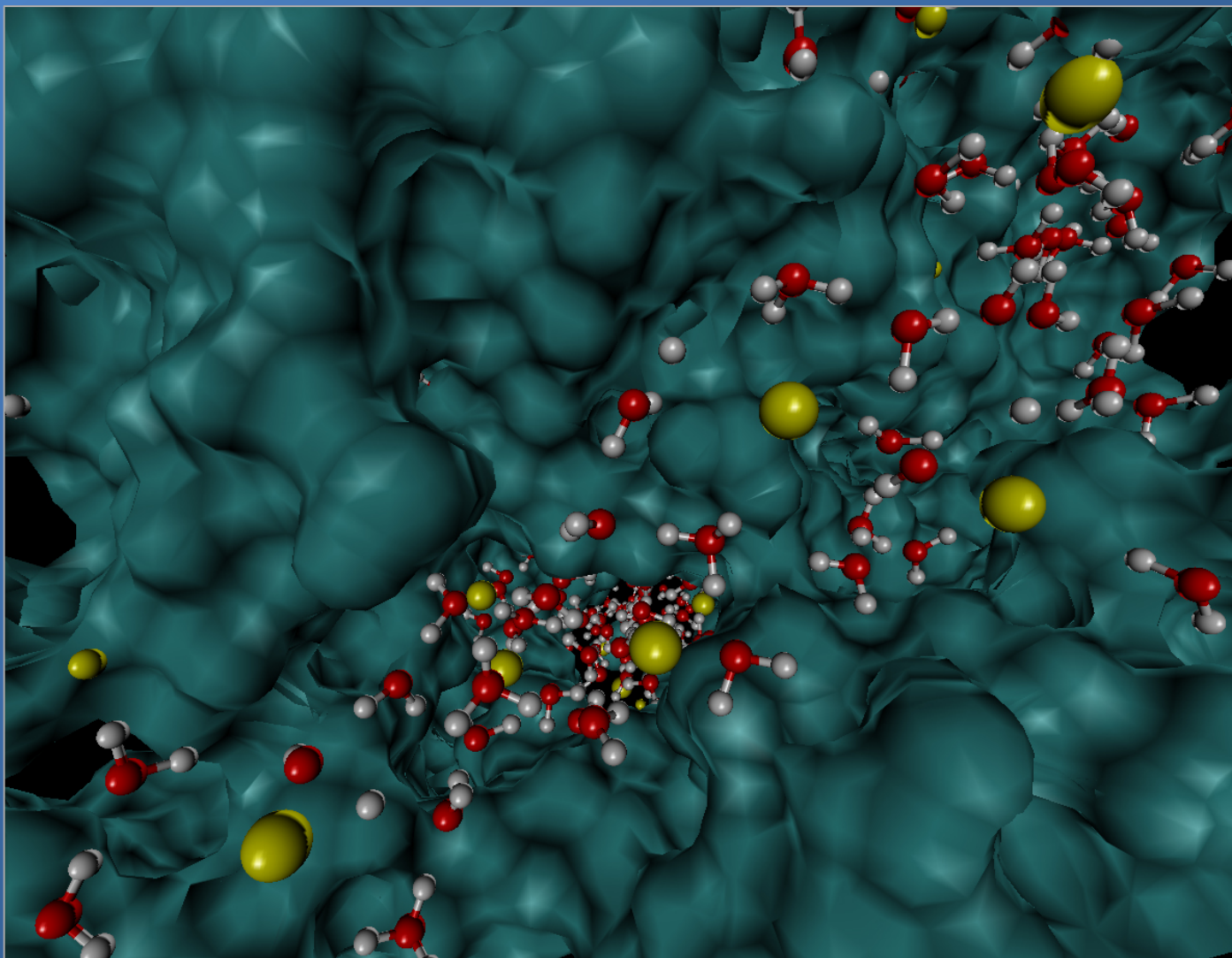
Resulted in development of highly efficient test engine by Cummins

# Computational Modeling



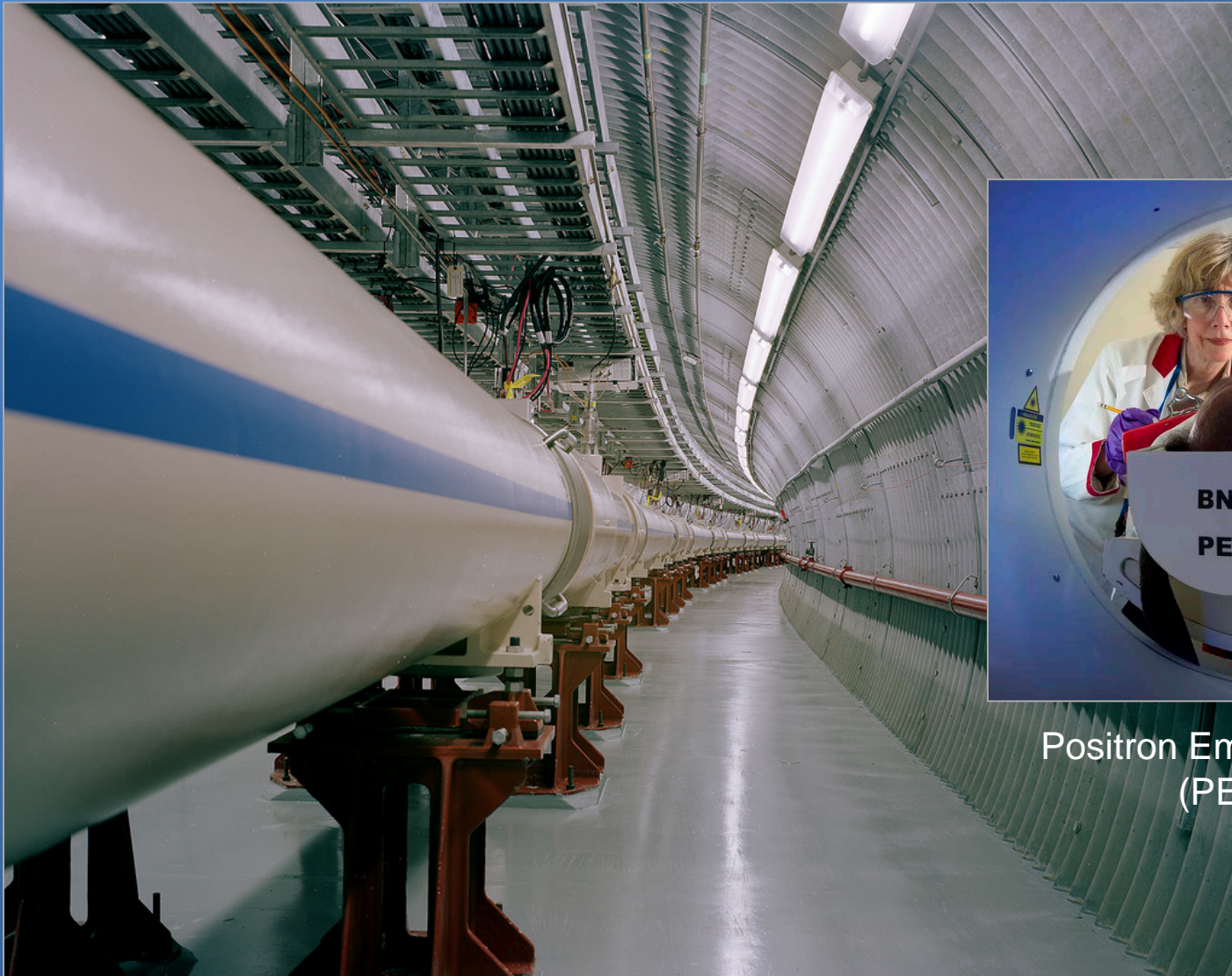
Computer-simulated image shows the formation of two high density regions in the early universe at SLAC National Accelerator Laboratory

# Computational Chemistry



Computational chemistry at Pacific Northwest National Laboratory

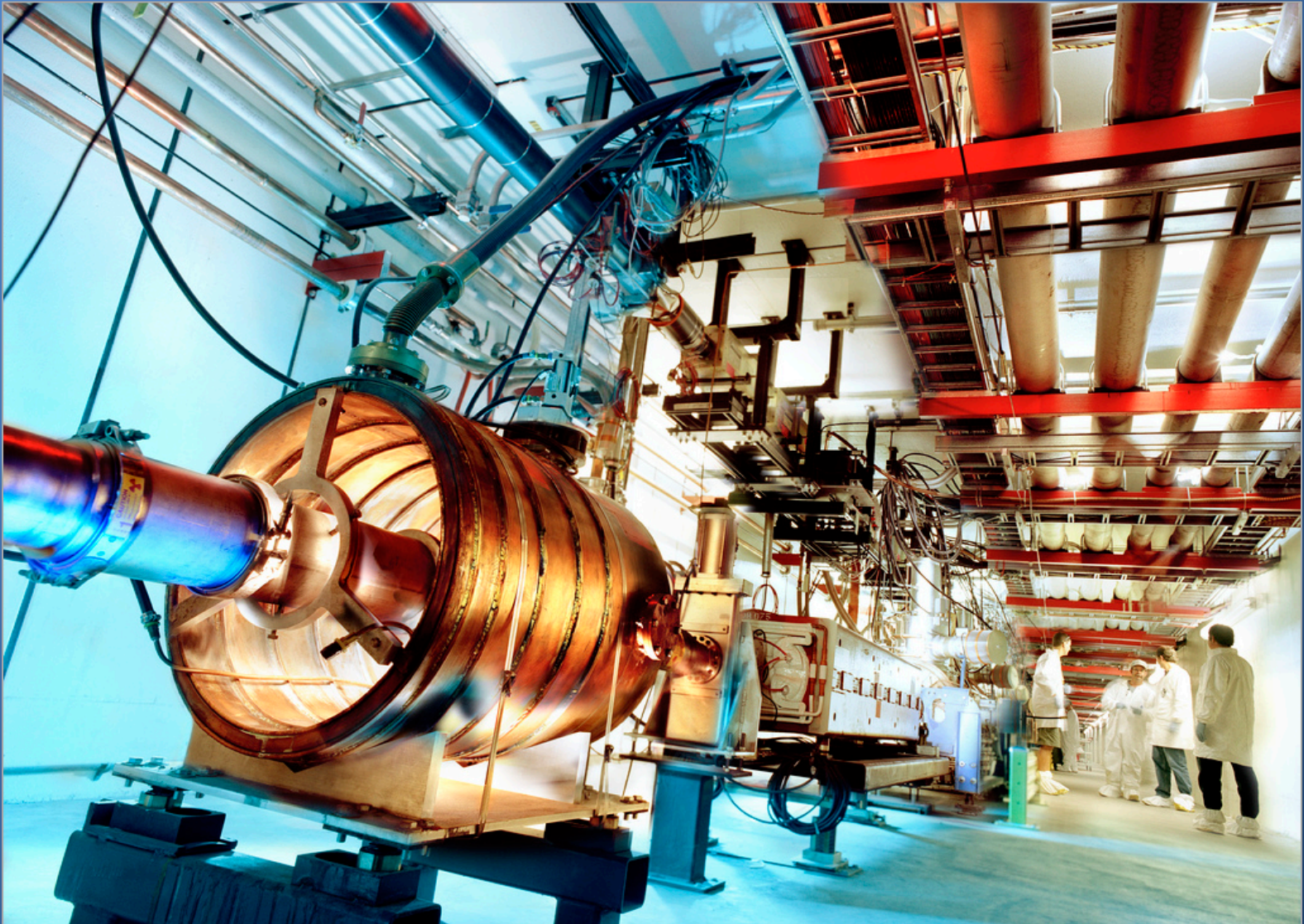
# Particle Accelerators



Positron Emission Tomography (PET) imaging

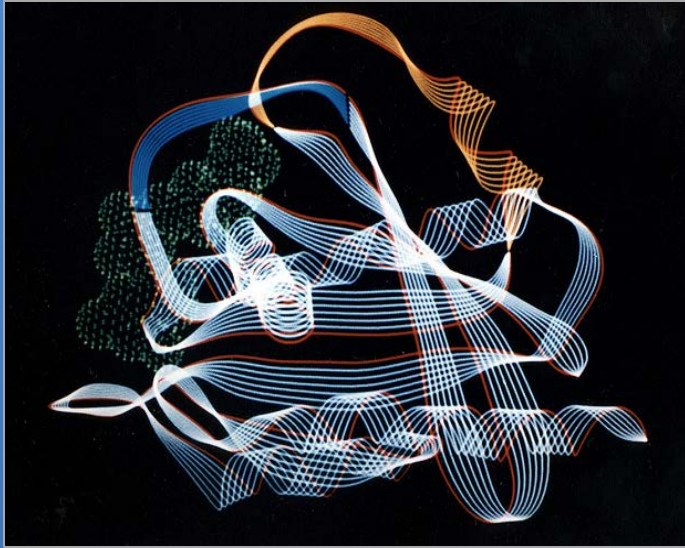


# Particle Accelerators

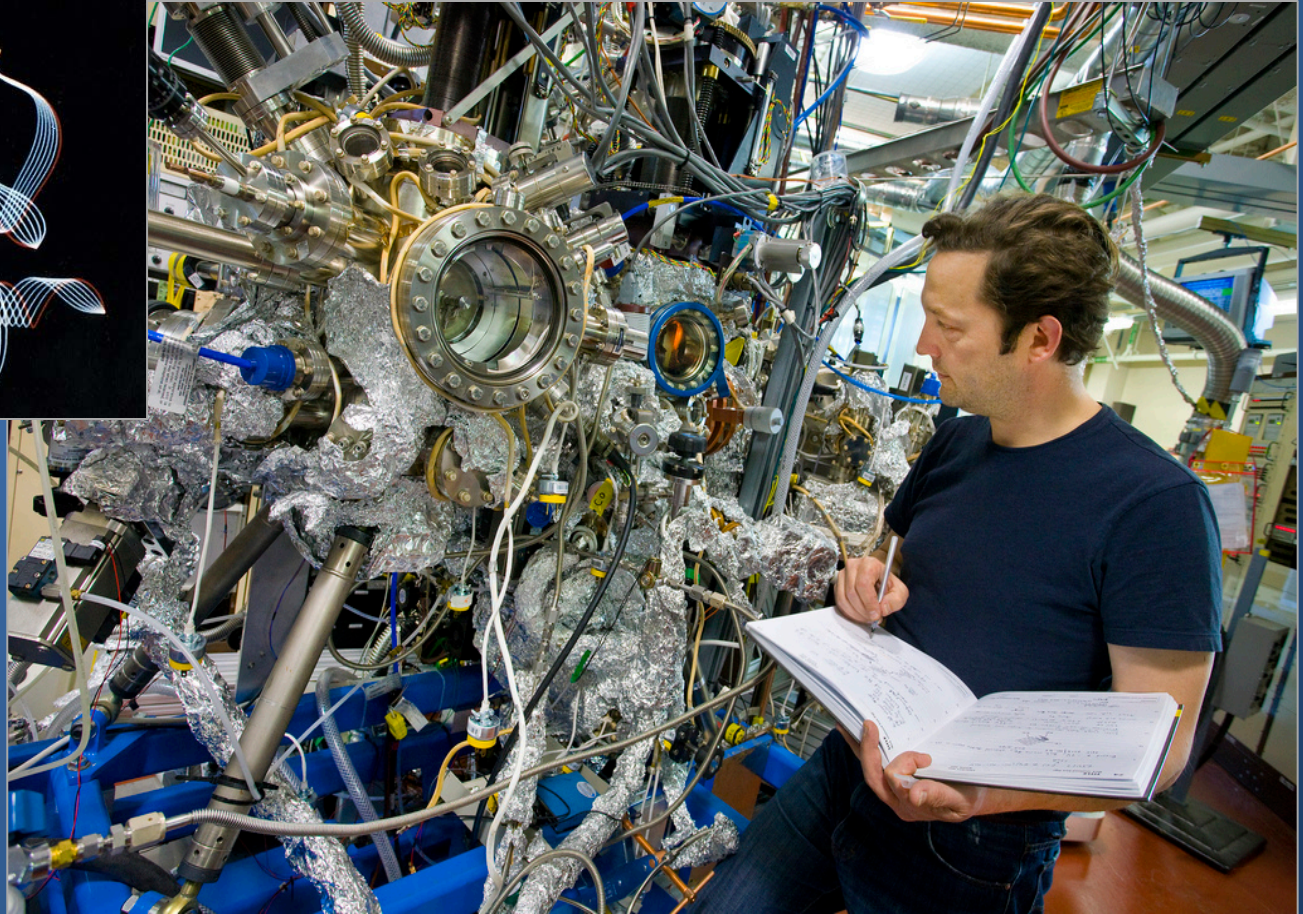


Fermilab's Main Injector Accelerator

# X-Ray Light Sources

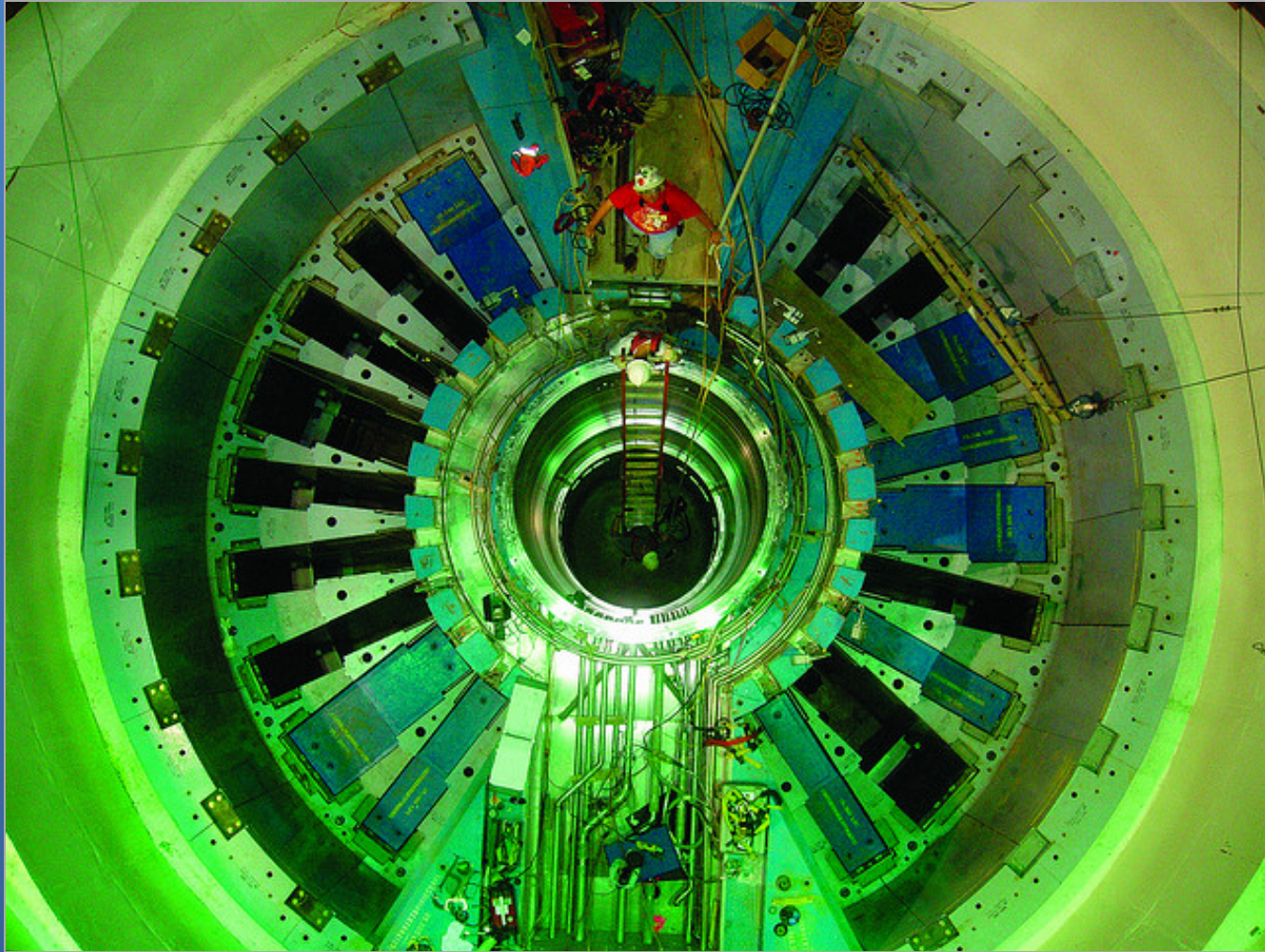


Backbone of the normal gas protein, as determined by x-ray diffraction



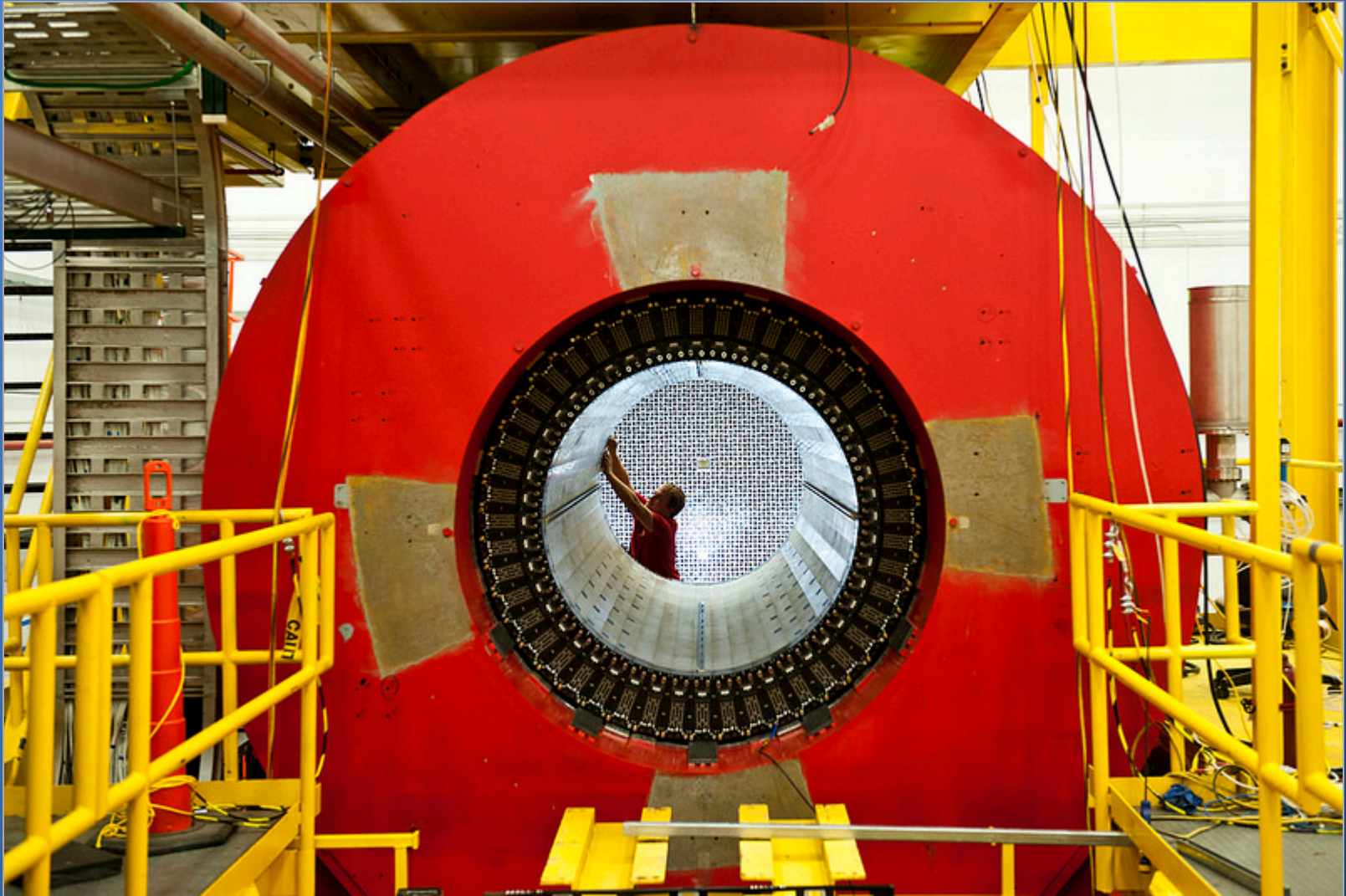
Beamline 11.0.2 at the Advanced Light Source at Lawrence Berkeley 10  
National Laboratory

# Neutron Scattering Sources



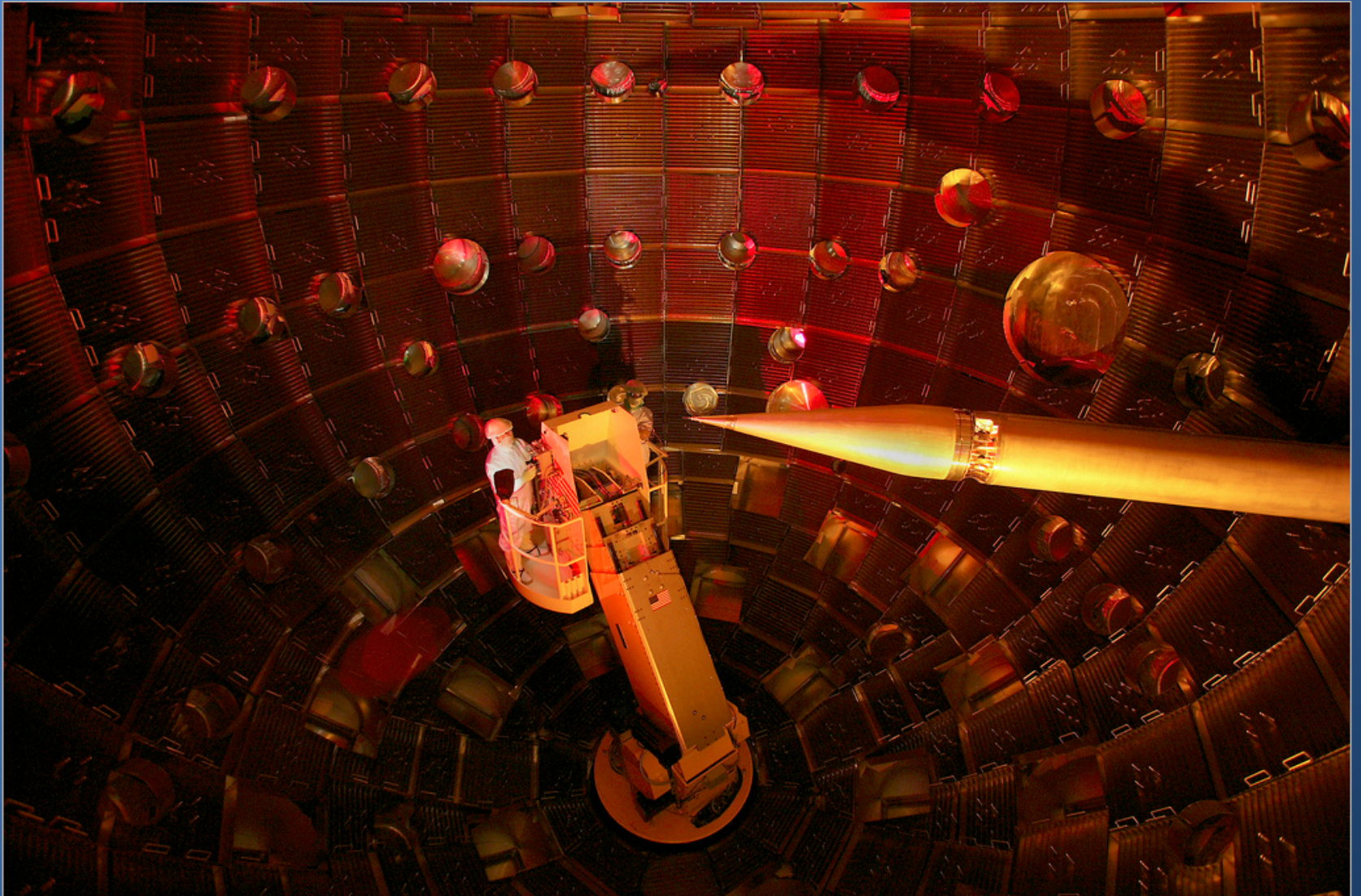
The Spallation Neutron Source chamber at Oak Ridge National Laboratory

# High Energy Particle Detectors



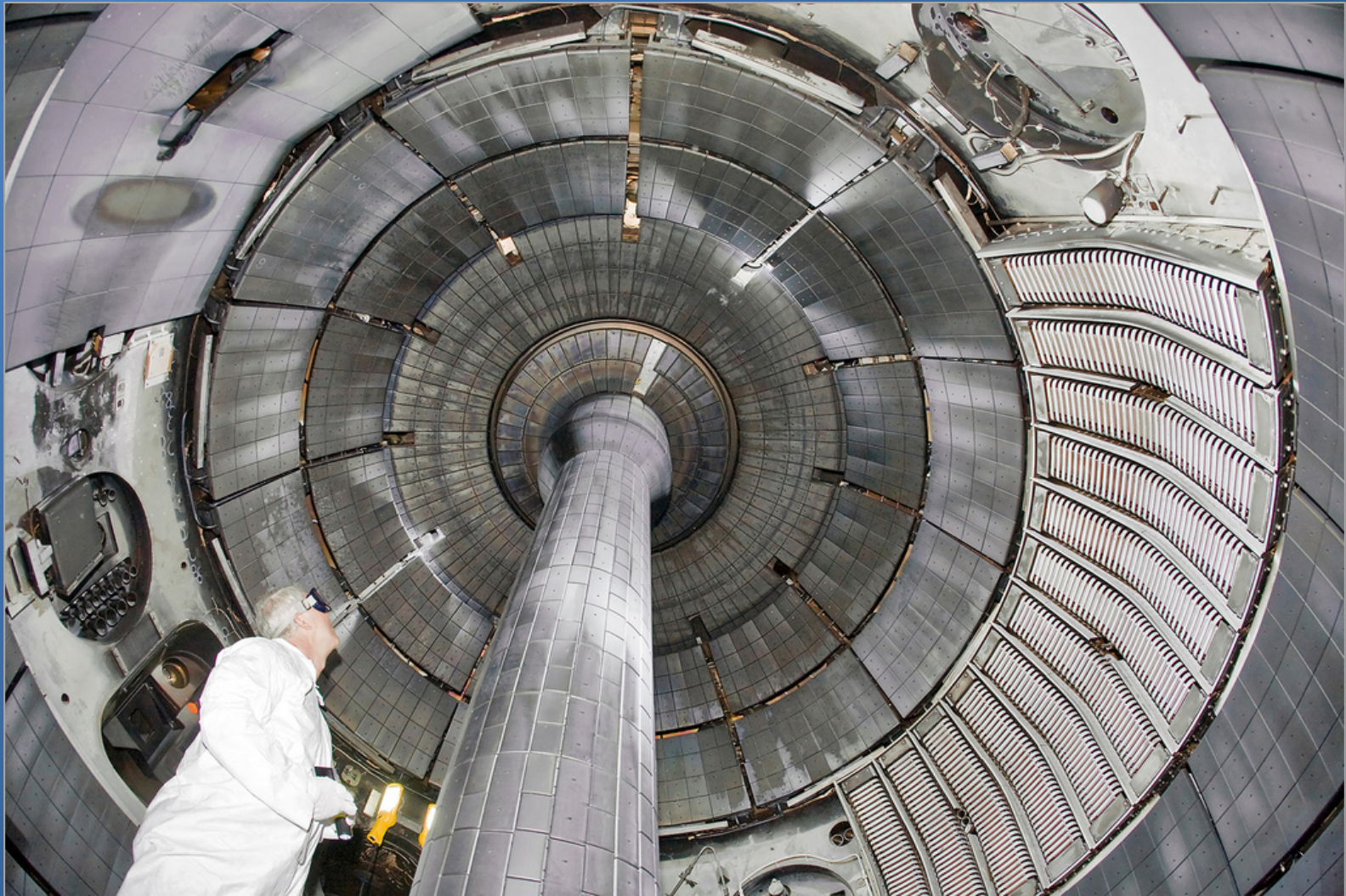
Superconducting Solenoid installed at Jefferson Lab

# Fusion Research



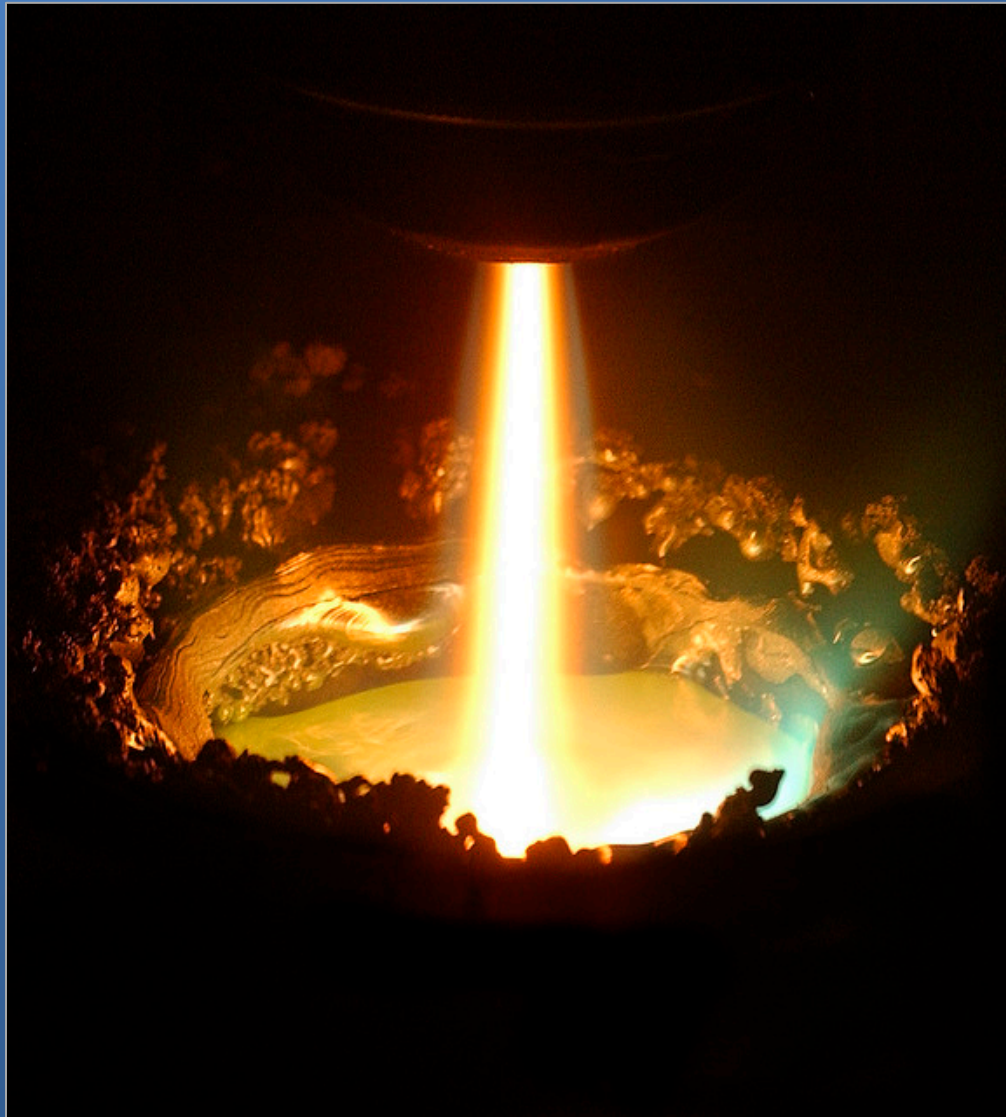
National Ignition Facility target chamber at Lawrence Livermore National Laboratory 13

# Fusion Research

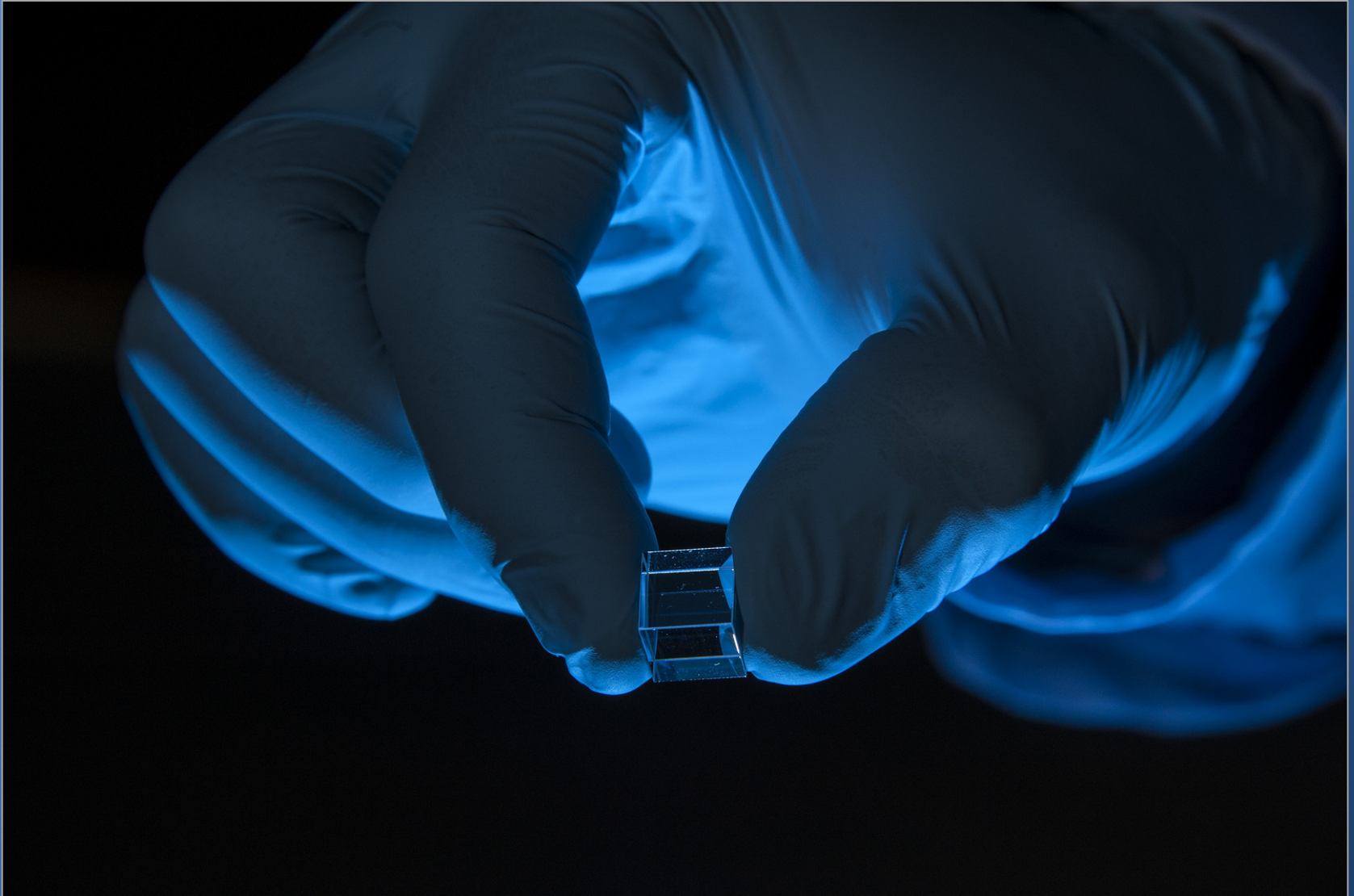


National Spherical Torus Experiment at Princeton Plasma Physics Laboratory

# Critical Materials



# Advanced Materials for Radiation Detection



Researchers at Savannah River National Laboratory are developing photonic crystals for enhanced radiation detectors<sup>16</sup>



# Additive Manufacturing



Robotic hand fabricated at Oak Ridge National Laboratory using additive manufacturing technology

# **Technologies Being Developed and Accomplishments**

# Competitive Solar Generation



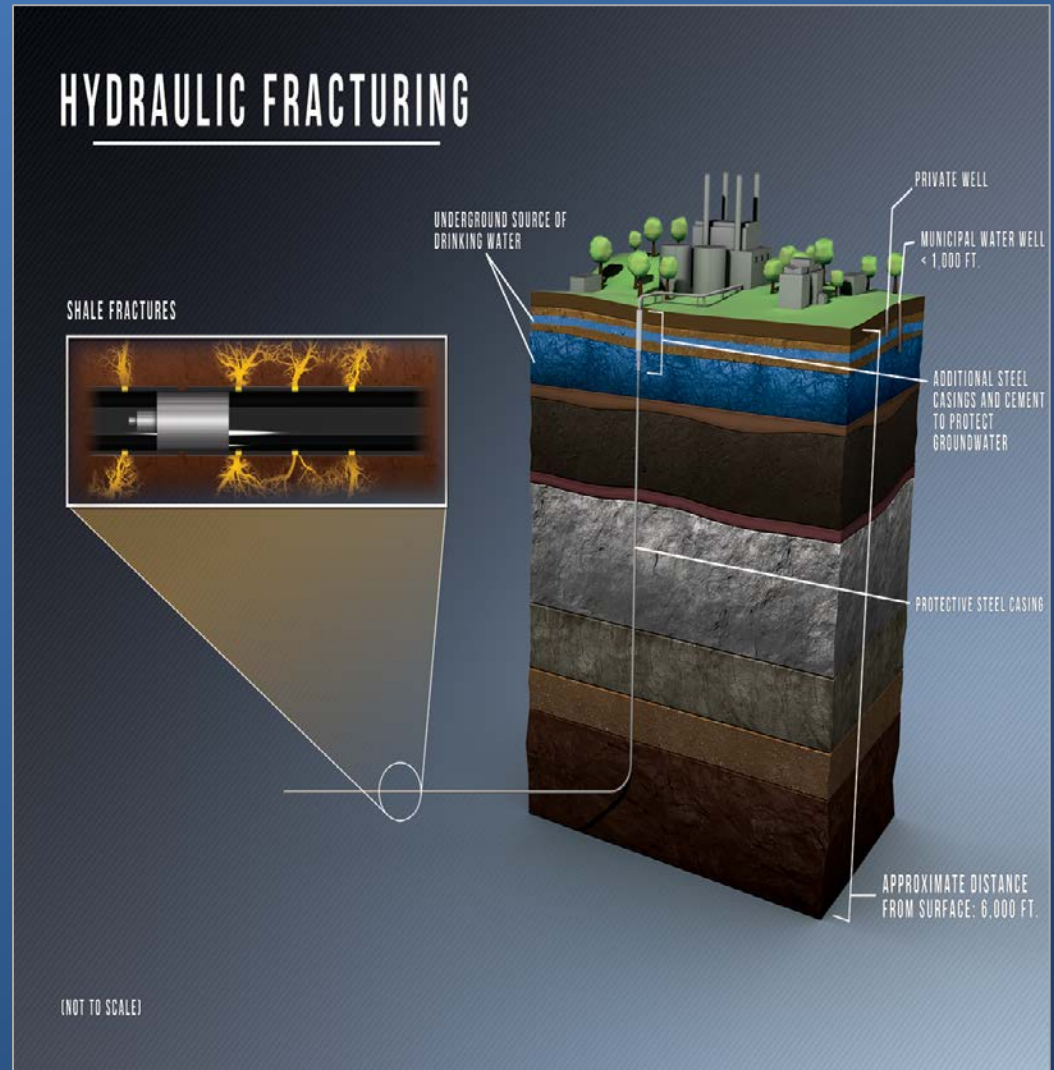
A First Solar associate at the company's Ohio manufacturing plant, which uses technology developed at the National Renewable Energy Laboratory

*Courtesy of First Solar*

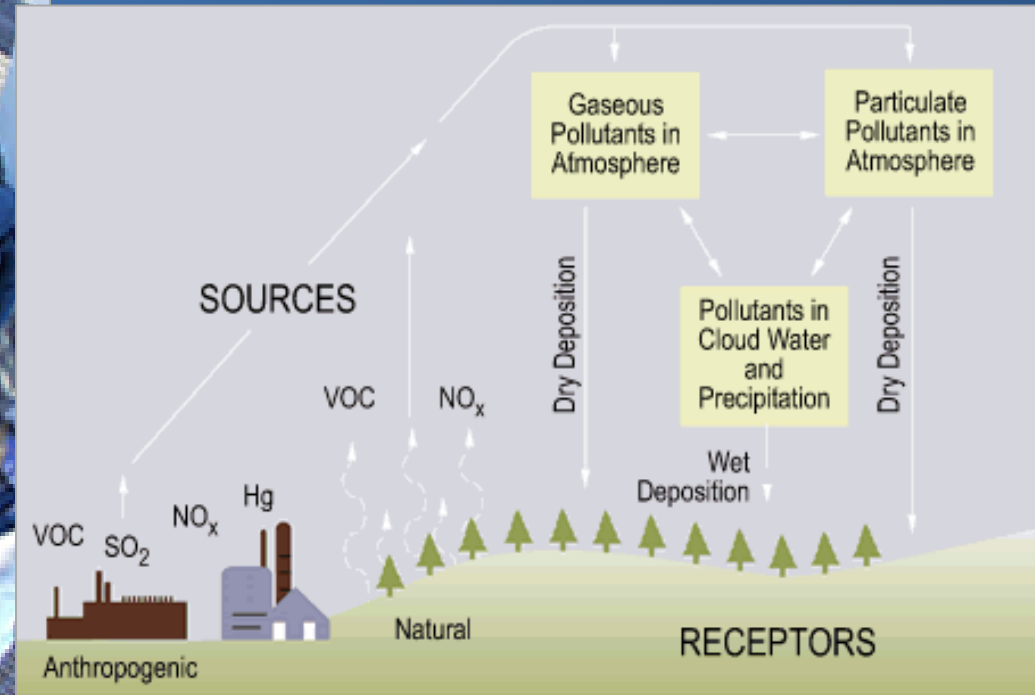
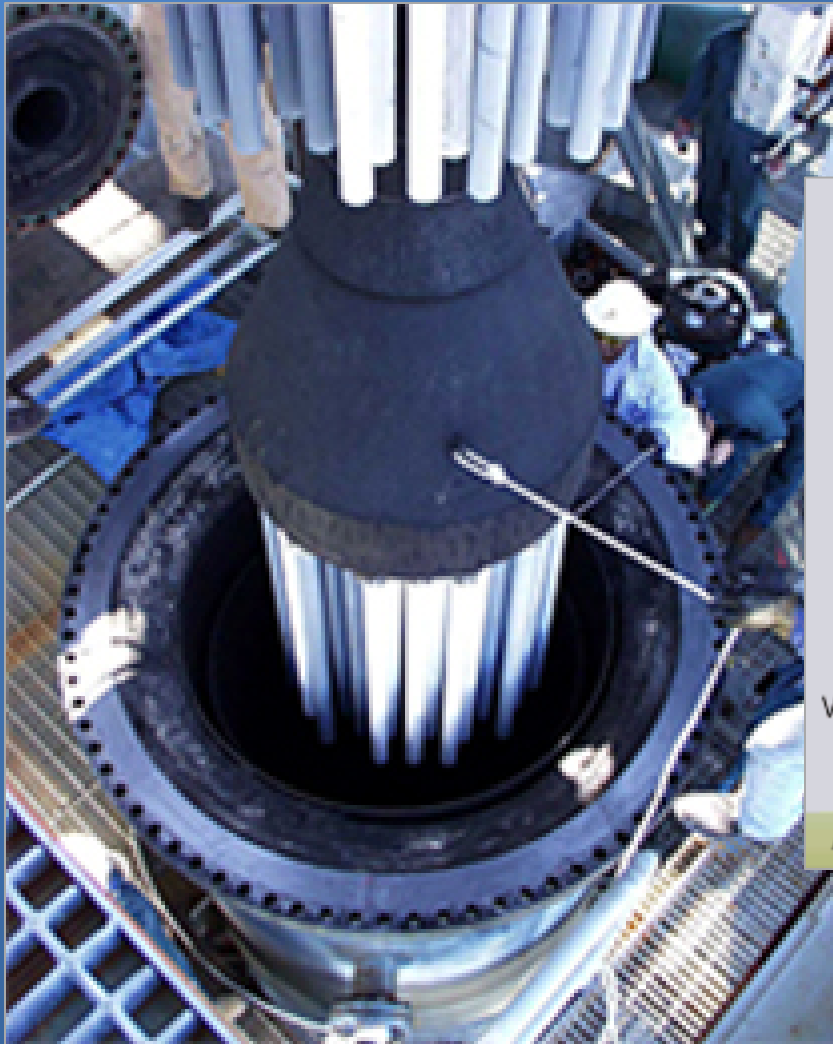
# Shale Gas Revolution



Prototype drill bit used for an experiment in Sandia National Laboratory's Hard-Rock Drilling Facility



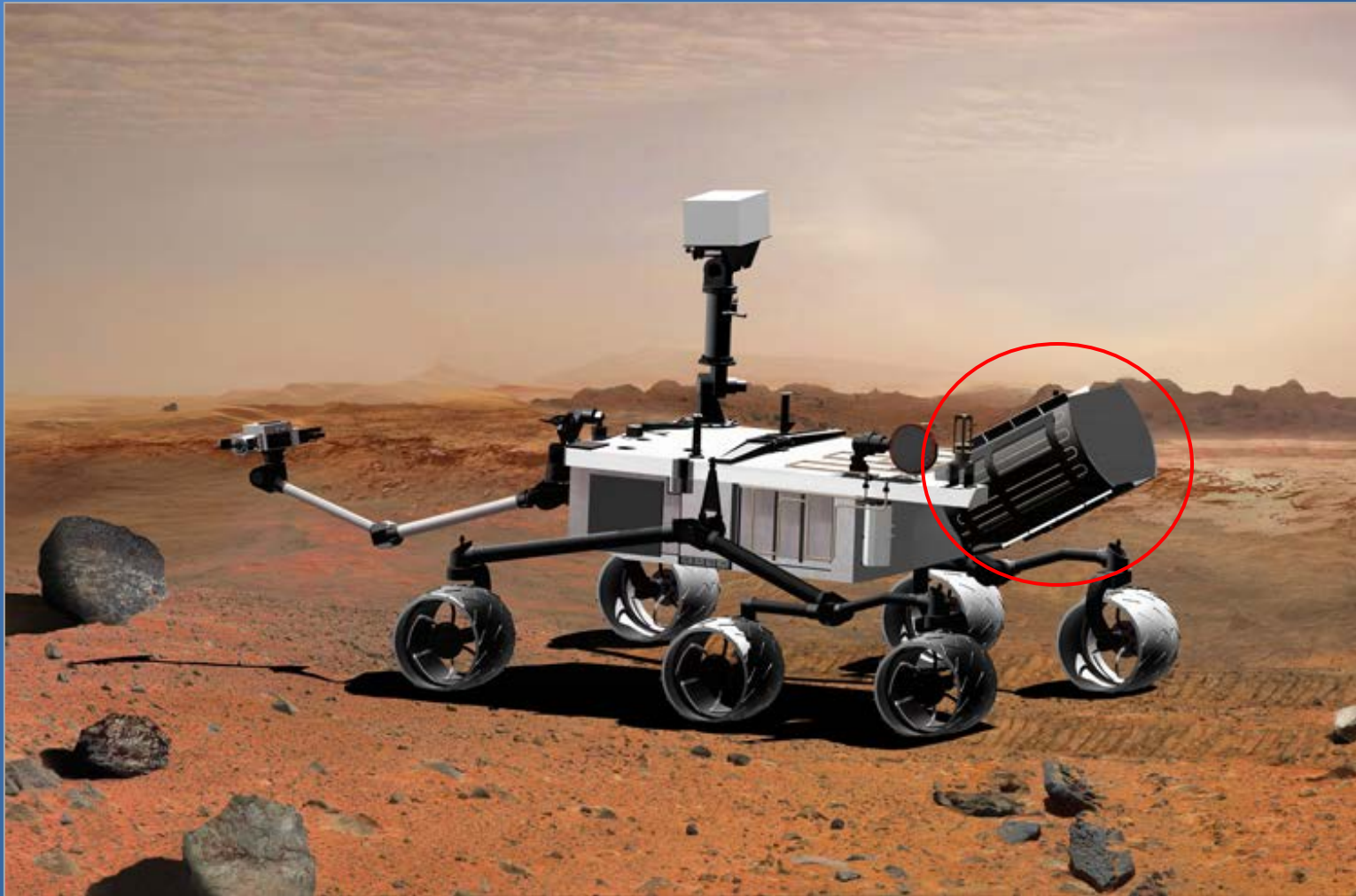
# Advanced Emissions Controls



Acid Rain Cycle

Candle Filter System at the National Energy Technology Laboratory

# Space Exploration



Mars Rover, Curiosity, powered by the Multi-Mission Radioisotope Thermoelectric Generator Advancement designed at Idaho National Laboratory

Photo courtesy of NASA/JPL-Caltech

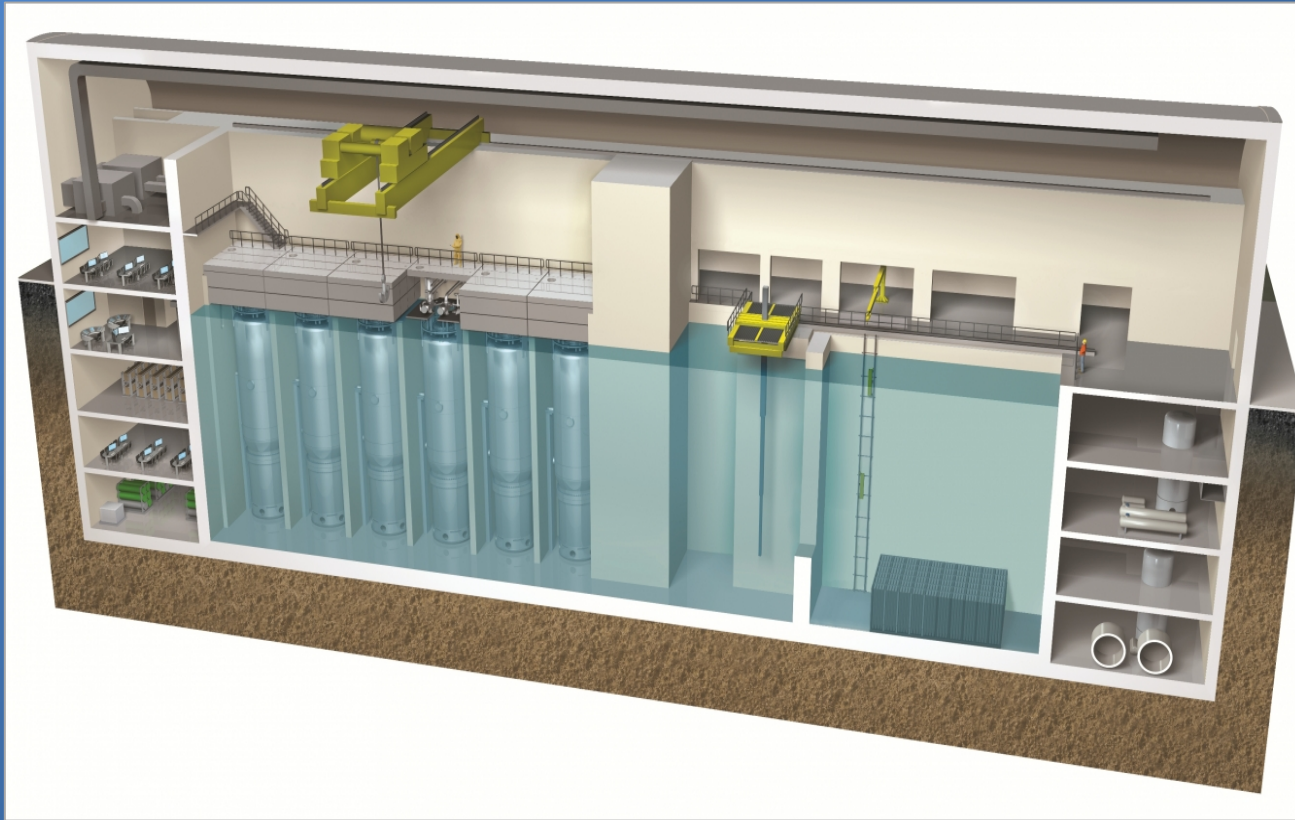
# SuperTruck Initiative



Supercomputing simulations at Oak Ridge National Laboratory led to the UnderTray System, dramatically reducing drag and increasing fuel mileage



# Small Modular Nuclear Reactor



NuScale Nuclear Power Reactor

© 2013 NuScale Power, LLC. All Rights Reserved



# Carbon Capture & Storage



Carbon capture technology testing at the National Carbon Capture Center located in Wilsonville, Alabama

# Smart Grid Technologies

