



Stewardship Science Academic Alliances Program

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Program Overview

The Stockpile Stewardship Program (SSP) is a scientific approach to ensure the safety, reliability, and performance of the nuclear stockpile in the absence of nuclear testing. The stewardship mission stresses increased fundamental understanding of physical phenomena associated with stockpile performance, safety, and reliability, as well as the preservation and enhancement of core science and technology competencies within the National Nuclear Security Administration/Defense Programs (NNSA/DP) complex. The NNSA/DP Office of Research, Development and Simulation is responsible for developing, maintaining, and integrating all technical and scientific capabilities necessary to execute the Stockpile Stewardship Program. Research activities supporting the SSP are conducted primarily at the three NNSA/DP laboratories: the Lawrence Livermore National Laboratory (LLNL), the Los Alamos National Laboratory (LANL), and the Sandia National Laboratories (SNL) and at several other NNSA-supported organizations: the Nevada Test Site (NTS), the Naval Research Laboratory (NRL), and the University of Rochester Laboratory for Laser Energetics (UR/LLE).

**Theoretical Description
of the Fission Process**
NNSA Grant DE-FG03-03NA00083

Research Areas

Properties of Materials under Extreme Conditions and Hydrodynamics

Research proposals are solicited in the area of fundamental properties and response of materials under extreme conditions and hydrodynamics.

High-Energy-Density Physics

Research proposals are solicited in the area of high-energy-density physics and fluid dynamics, with particular emphasis on experimental investigations based on the utilization of lasers and/or pulsed power technology

Low-Energy Nuclear Science

Research proposals are solicited in the area of nuclear science with an emphasis on low energies. The specific sub-areas of interest are:

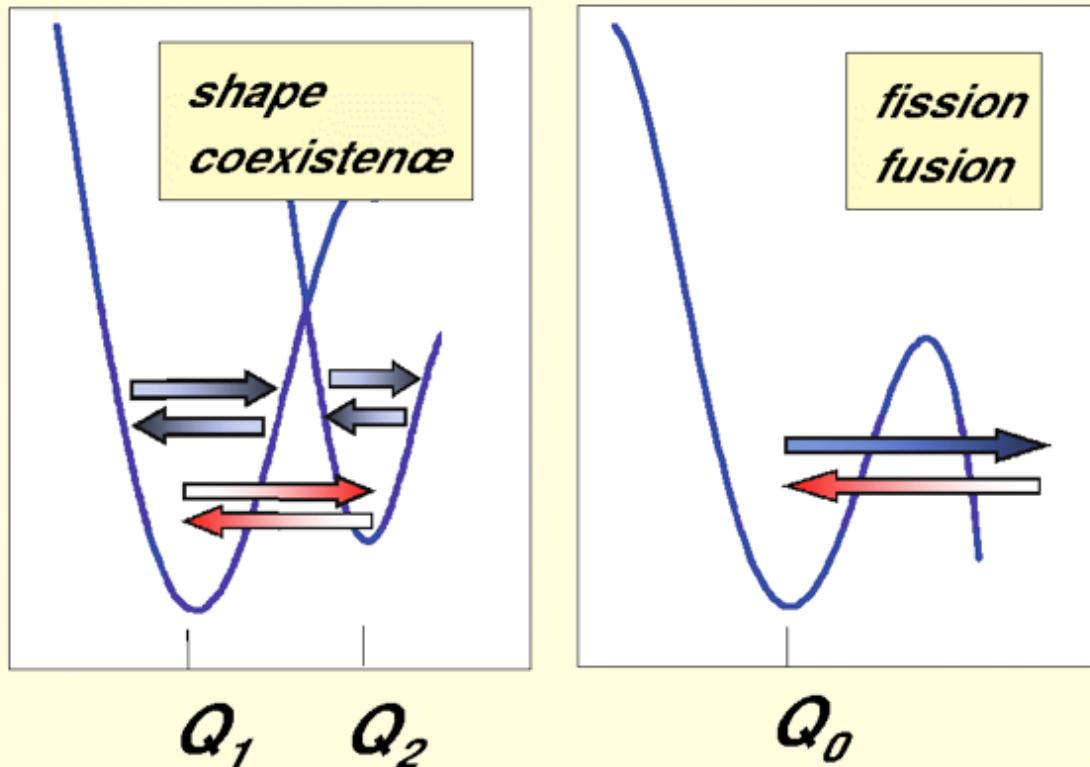
- Investigations leading to greater accuracy in the knowledge of low energy cross sections of stable and unstable nuclei and corresponding reaction rates for neutron-, gamma- and ion-induced reactions for both simulation and radiochemistry diagnosis;
- Development of advanced simulations and measurement techniques leading to improved radiation and particle detection methods, in terms of energy and spatial resolution;
- Physics of the fission process, including division of mass and charge as a function of excitation, production of energy, and the reaction properties of prompt fission products;
- Investigations of particle production and advanced diagnostic techniques relevant to high-energy proton radiography and advanced diagnostic techniques relevant to X-ray radiography;
- Development of experimental diagnostic techniques for laser or pulsed power implosion systems.

Theoretical Description of the Fission Process



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Energy



Collective Coordinate

Project supported by the [National Nuclear Security Administration](#) under the Stewardship Science Academic Alliance program through Department of Energy research grant DE-FG03-03NA0083.



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Workshops

2004 Annual Workshop

On March 17-19, 2004, we held an **International Workshop on the Theoretical Description of the Nuclear Large Amplitude Collective Motion** (with a focus on fission) at the Joint Institute for Heavy Ion Research in Oak Ridge. The workshop was attended by 25 participants and involved five participants from NNSA/DP Laboratories (LANL and LLNL), as well as students and post-docs. The program of the workshop can be found [here](#).

2005 Annual Workshop

The **Second International Workshop on the Theoretical Description of the Nuclear Large Amplitude Collective Motion** was held March 30 - 31, 2005, at the Joint Institute for Heavy Ion Research, Oak Ridge. The workshop was attended by 21 participants and involved five participants from NNSA/DP Laboratories (LANL, LLNL, NNSA), as well as students and post-docs. The program of the workshop can be found [here](#).

2007 Joint JUSTIPEN-LACM Meeting

The **Joint JUSTIPEN-LACM Meeting** will be held on March 5-8, 2007 in the Joint Institute for Heavy Ion Research (JIHIR) at Oak Ridge National Laboratory. The meeting is a merger of two workshops: (i) the US-Japan theory meeting under the auspices of the Japan-US Theory Institute for Physics with Exotic Nuclei (JUSTIPEN) and (ii) the annual NNSA-JIHIR meeting on the nuclear large amplitude collective motion (LACM) with an emphasis on fission. The program of the meeting can be found [here](#).

Fission is a fundamental many-body phenomenon that possess the ultimate challenge for theory

Understanding crucial for many areas:

- Nuclear structure and reactions (superheavies)
- Astrophysics (n-rich fission and fusion, neutrino-induced fission)
- Numerous applications (energy, AFC, Stockpile Stewardship...)
- ...

The light in the end of the tunnel: coupling between modern microscopic many-body theory and high-performance computing