Presentation at the Workshop on The Nation's Needs for Isotopes: Present and Future

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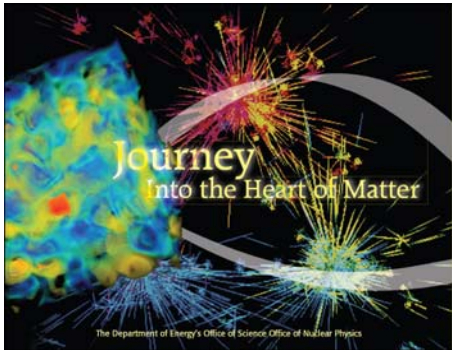
U.S. Nuclear Physics

The DOE SC Nuclear Physics Program is the Federal steward

Mission is to maintain the Nation's leadership and competency in fundamental nuclear physics

Provides over 90% of the Federal support



Responsible for Strategic Planning and Funding

- Identify the scientific opportunities for discoveries and advancements
- Build and operate forefront facilities to address these opportunities
- Develop and support a research community that delivers significant outcomes
- Work with other agencies/countries to optimize use of U.S. resources

Goals are:

- World-class facility research capabilities (to make significant discoveries/advancements)
- A strong, sustainable research community (to deliver significant outcomes)
- Forefront advanced technologies capabilities (for next-generation capabilities)
- A well-managed, strategic sustainable program (that ensure leadership/optimize resources)

Deliverables are:

- New insights and advancements in the fundamental nature of matter and energy
- New and accumulated knowledge, developed and cutting-edge technologies, and a highly-trained next-generation workforce that will underpin the Department's Missions and the Nation's nuclear-related endeavors

The DOE SC Nuclear Physics Program Supports Researchers and Operates Facilities

U.S. Department of Energy
Office of Science

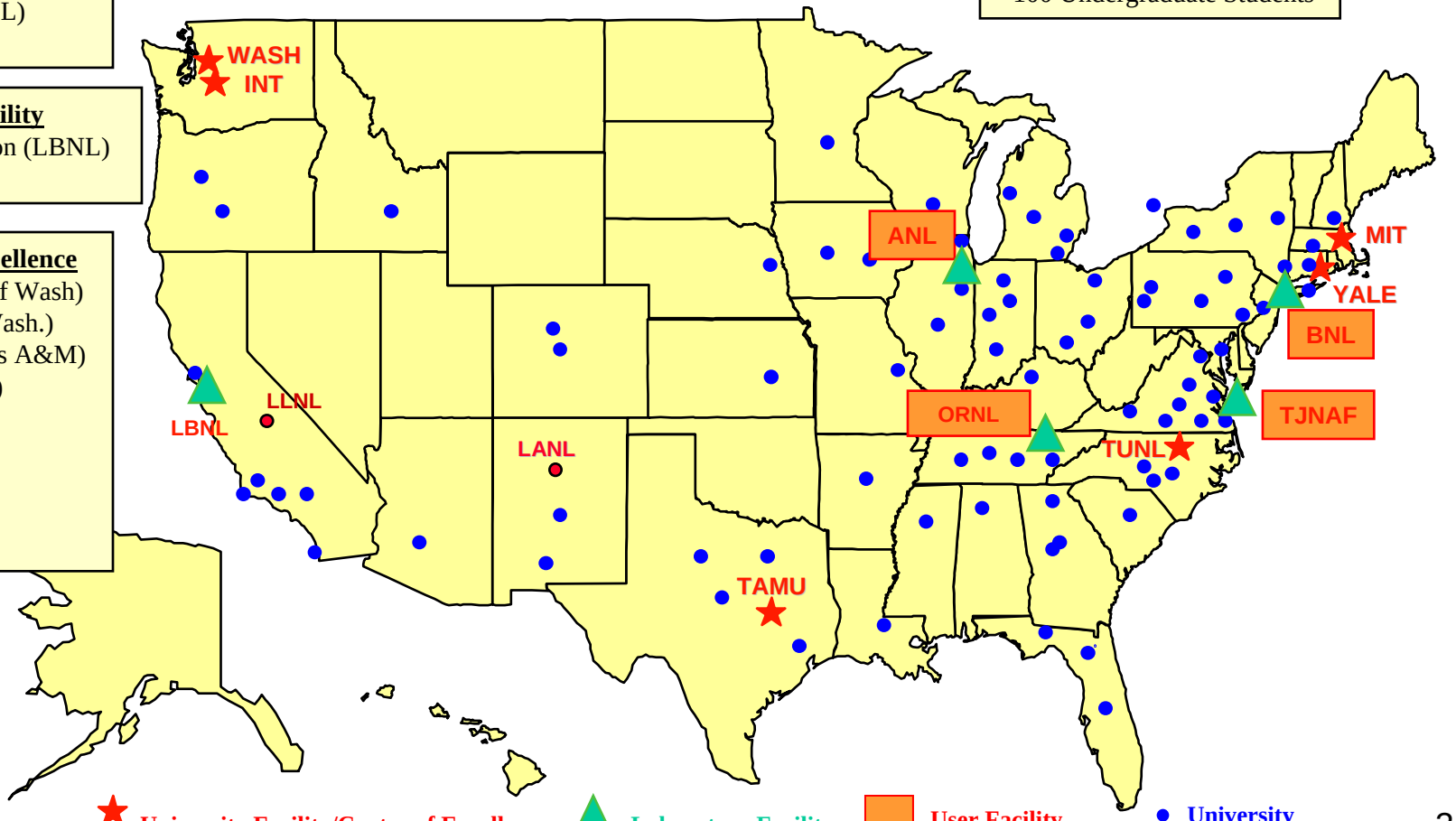
National User Facilities
- RHIC (BNL)
- CEBAF (TJNAF)
- ATLAS (ANL)
- HRIBF (ORNL)

Other Lab. Facility
- 88-Inch Cyclotron (LBNL)

Centers of Excellence
- CENPA (U. of Wash)
- INT (U. of Wash.)
- TAMU (Texas A&M)
- TUNL (Duke)
- REC (MIT)
- WNSL (Yale)

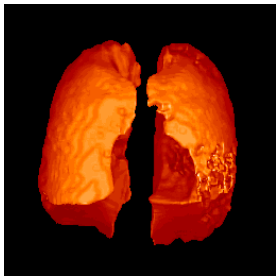
Research Groups
- 7 National Laboratories
- 85 Universities

Univ. Grants (>$60M)
~360 Faculty & Staff
~200 Post-docs
~400 Graduate Students
~100 Undergraduate Students



Nuclear Physics develops advanced instrumentation and techniques

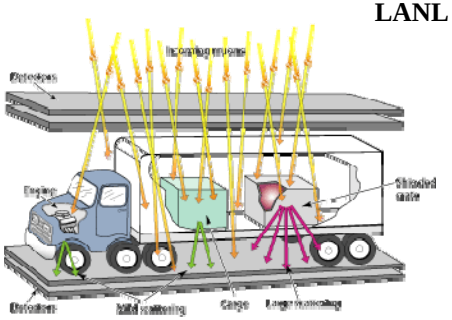
U.S. Department of Energy
Office of Science



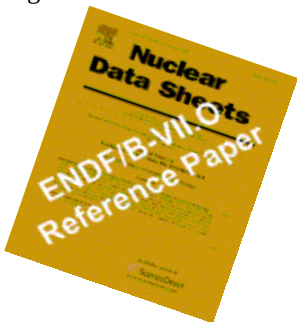
U of VA
TJNAF

Imaging lungs with polarized Xe

LANL



Searching for SNM with cosmic rays

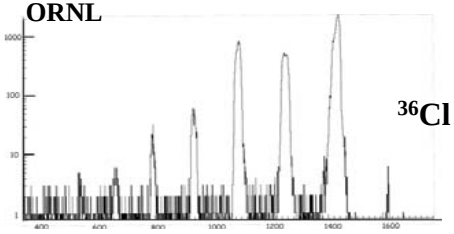


BNL

Nuclear Data for next next generation reactors

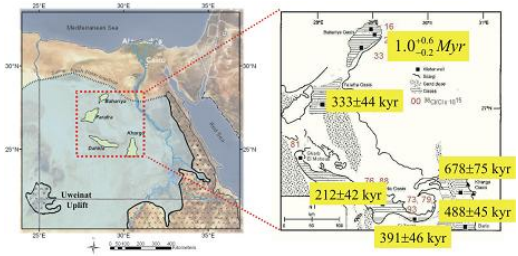
Medical Diagnostics and Therapy Radiography Computerized tomography Positron emission tomography MRI (regular) MRI (with polarized noble gases) Photon therapy Particle-beam therapies	**Material Analysis** Activation analysis Accelerator mass spectrometry Atom-trap trace analysis Forensic dosimetry Proton-induced x-ray emission Rutherfold backgrounding Ion-induced secondary-ion emission Muon spin rotation
Safety and National Security Airport safety and security Large-scale x-ray scanners Nuclear materials detection Arms control and nonproliferation Stockpile stewardship Tritium production Space-radiation health effects Semi-conductors in radiation environments Food sterilization	**Environmental Applications** Climate-change monitoring Pollution control Groundwater monitoring Ocean-current monitoring Radioactive-waste burning
Energy Production and Exploration Nuclear reactors Oil-well logging R&D for next generation nuclear reactors **Art and Archaeology** Authentication Nuclear dating	**Materials Testing and Modification** Trace-isotope analysis Ion implantation Surface modifications Flux-pinning in high-Tc superconductors Free-electron lasers Cold and ultracold neutrons Single-event efforts Microphone filters

ORNL



Accelerator mass spectrometry of sea water to monitor deep currents

ANL



Determination of ages of Egyptian aquifers with ATTA

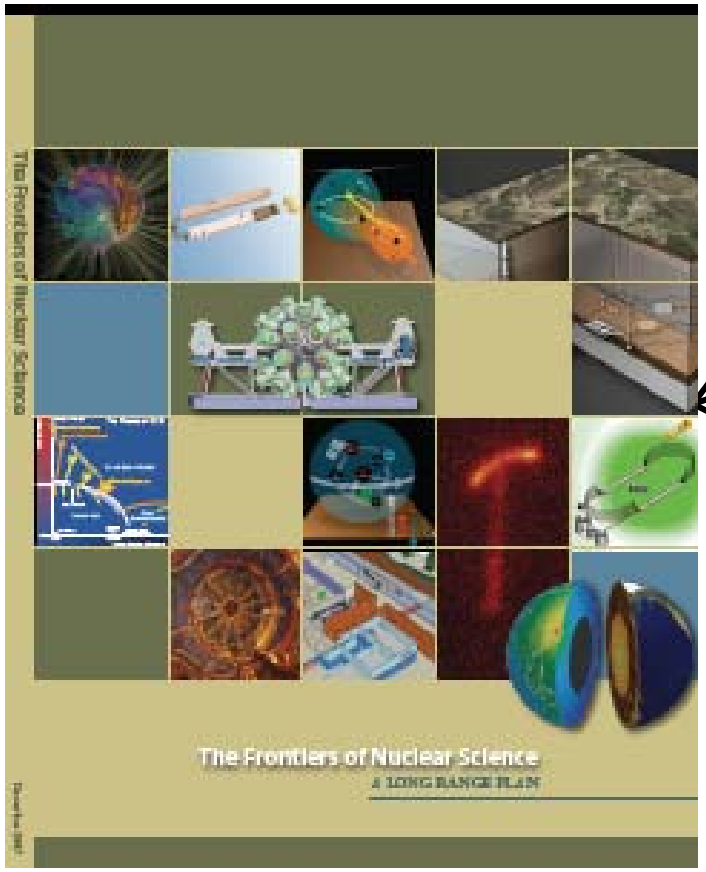
LBNL

Tests of micro-electronics for space applications

The Frontiers of Nuclear Science
A Long Range Plan

Scientific frontiers and opportunities are identified by the scientific community

- Primary guidance has come from DOE/NSF Nuclear Science Advisory Committee (NSAC)
- Other guidance obtained from National Academy of Science (NAS), Interagency/International studies, facility PACs, etc.



Quantum Chromodynamics:
From the Structure of Hadrons to the Phases of Nuclear Matter

Nuclei:
From Structure to Exploding Stars

In Search of the New Standard Model

Investments in new capabilities a priority of the LRP

NP and Isotopes Program

- **The FY 2009 President's Request proposes to transfer the Isotope Production Program from the Office of Nuclear Energy to the Office of Science: Office of Nuclear Physics.**
  - The program is renamed the *Isotope Production and Applications Program*
  - Includes Isotope Production Infrastructure and a new initiative entitled Research Isotope Development and Production – priorities will be defined by NSAC and peer review

- **NP program has the expertise and experience in operating facilities and developing technologies that are relevant to the production of stable and radioactive isotopes. Transfer will allow the strengthening of synergy between the two communities and opportunities for new collaborations.**

- **Ultimate responsibility of the Isotope Program resides with NE until there is an Appropriation, but indications the program will transfer are positive.**

- **NP is working closely with NE and isotope stakeholders in anticipation of the transfer.**

Planning for transition to Nuclear Physics has begun

- Isotope staff (2 FTE) will transfer from NE to NP
- Assets such as facilities, inventories, and account receivables will be transferred
- Commitments, Memorandum of Agreement/Understanding and isotope supply contracts
- Communicate with federal agencies involved in isotope production
  - Established a Working Group with NIH to address NAS study recommendations
- Define isotope pricing policy for research isotopes with the goal of supplying stable supplies of affordable isotopes; commercial isotopes will continue to be at full cost recovery
- Establish peer review mechanisms for facilities and programs in Isotope Program (NSAC will be charged – prioritize opportunities with research isotopes)
- Develop a strategic plan for program (NSAC will be charged to develop prioritized long range plan)
- Identify what role NP facilities and researchers can play in development and production of isotopes – strengthen lines of communication
- Include isotope production research and development in NP SBIR/STTR solicitation

Isotope Program in FY 2009

- Funding for physical sciences, Office of Science and Nuclear Physics has been basically constant (eroded by inflation) over last number of years. Appropriations have fallen substantially less than requested amounts.

- Obtaining funding at the FY 2009 Budget Request is extremely important for implementing a world-class nuclear physics program. Appropriations at less than the President's Request level will impact research at universities and national laboratories, and facility operations and health.

- FY2009 President's Request includes $16.7million for Isotope Production
  - Facilities and capabilities for production of isotopes where there is no U.S. private sector capability or capability is insufficient to meet U.S. needs
  - Scientific and technical staff associated with general isotope development and production

- FY 2009 President's Request includes $3.2million for research and development and production of research isotopes.

- The funding available in the Isotope Production and Applications Program is constrained and will not meet the current demands of the Nation in isotope production.

Purpose of the Workshop

- Establish/strengthen communication with stakeholders in isotope production (research, federal, industrial)
- Assemble broad representation of stakeholders to discuss current and projected isotope needs
- Plenary Session is intended to give broad introduction into how isotopes are used by various disciplines
  - Will also communicate those isotopes which are predicted to not meet the known needs
- Three Working Groups (Second and Third days):
  - Stable and Enriched (both research and applied)
  - Radioisotopes for Research and Development
  - Radioisotopes for Applications
  - All include broad federal, research and industrial representation
  - Size of Working Groups kept purposefully “small”
- Poster Session
  - Additional details
  - Background for Working Groups
- Dinner

Goals of the Workshop

- **Workshop Goals**:
  - Who uses isotopes and why?
  - Who produces them and where?
  - What is the status of the supply and what is missing?
  - What are the needs today and in the future?
  - What are the options for increasing availability and associated technical hurdles?

- **The deliverable** will be a report which articulates the Nation's needs for isotopes across the various disciplines, the challenges in meeting those needs and options for improving the capabilities for meeting the demands.
  - First step towards development of comprehensive and prioritized strategic plan
  - NSAC will use this input (and others) to develop a long range plan

Not part of Workshop

What the Workshop does **NOT** include:

- Setting priorities
- Making business deals
- Discussions on pricing policy
- Discussions of propriety information
- Observers in the Working Group – invited and active participants only

Lots of frustration – need to put aside to be productive

Lots of individual agendas – leave them at home

Several major isotope issues in supplies of certain isotopes; could easily dominate discussions – need to acknowledge, articulate and move on

Near Term Challenges

- Transfer of the Isotope Program is an exciting opportunity
- Build synergy between basic research programs and isotope production and development – dedicated research isotope production and development program
- Define new and effective mechanisms of communication between Program and stakeholders

- Program is strained and underfunded
  - Cannot meet growing demands
  - Facilities require investment for robust operations
  - Staffing levels are inadequate

- Setting priorities is a necessity
- Developing a strategic plan in the context of broad needs vs those specific to a particular interest group is a necessity
- Optimum use of existing resources is a necessity
- Exploring partnerships with other federal agencies and commercial entities to leverage investments

- This Workshop is the first step in addressing these challenges - your perspective and expertise will make this endeavor successful

Institutions

- **Federal**
  - National Institute of Health
  - Department of Homeland Security
  - Department of Agriculture
  - Nuclear Regulatory Commission
  - DOE Nuclear Energy
  - DOE Basic Energy Sciences
  - DOE Nuclear Physics
  - DOE Biological and Environmental Research
  - DOE Chicago
  - DOE CFO
  - Office of Science and Technology Policy
  - National Nuclear Security Administration
  - National Institute of Standards and Technology
  - National Institute of Child Health and Human Development
  - Department of State
  - Federal Bureau of Investigation
  - Environmental Protection Agency
  - National Science Foundation
  - Office of Naval Research
  - Armed Forces Radiobiology Research Institute

- **National Laboratories**
  - Argonne National Laboratory
  - Brookhaven National Laboratory
  - Lawrence Berkeley National Laboratory
  - Los Alamos National Laboratory
  - Oak Ridge National Laboratory
  - Pacific Northwest National Laboratory
  - Idaho National Laboratory
  - Lawrence Livermore National Laboratory
  - TRIUMF

- International Atomic Energy Agency

- **Universities**
  - Michigan State University
  - University of Washington
  - University of Missouri
  - Texas A&M University
  - Duke University
  - Washington University
  - University of California/Davis
  - Georgetown University Hospital
  - University of Buffalo
  - University of British Columbia
  - Caltech
  - University of Tennessee
  - Research Triangle Institute
  - North Carolina State University
  - University of Connecticut
  - University of San Francisco
  - Memorial-Sloan Kettering
  - American College of Radiology

- **Industrial**
  - MDS Nordion
  - GE Energy Reuter Stokes
  - Spectra Gases
  - Trace Life Sciences, Inc.
  - Association of Energy Services
  - SABIA, Inc.
  - Council of Radionuclides and Radiopharmaceuticals
  - General Atomics
  - Techsource, Inc.
  - Halliburton
  - Advance Medical Isotope
  - JUPITER Corp.
  - Raytheon
  - NorthStar Medical Radioisotopes
  - TRIGA Reactor Systems

- The National Academies