U.S. DEPARTMENT OF ENERGY

Office of Nuclear Physics Program Update

DOE/NSF Nuclear Science Advisory Committee Meeting
February 26, 2010

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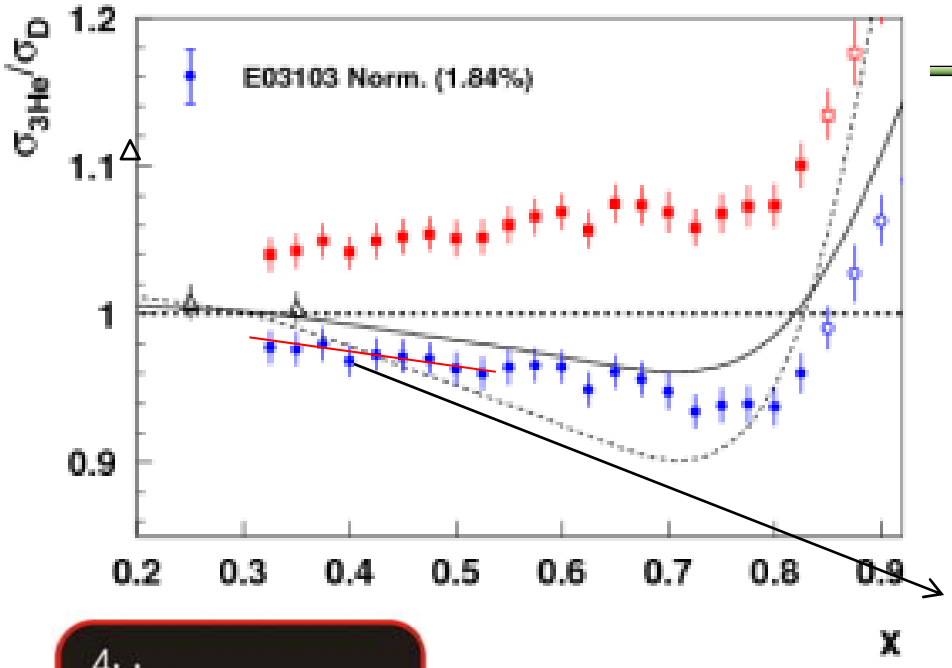
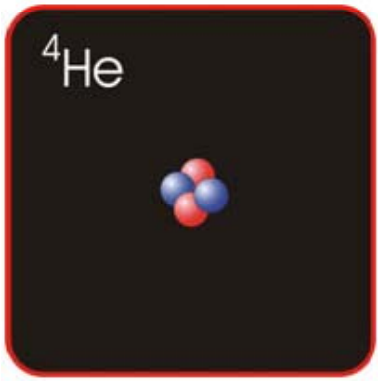
U.S. DEPARTMENT OF ENERGY

Outline

- Program News
- FY2010 Appropriation
- FY 2011 Request
- Future Challenges
- Office of Nuclear Physics News

Selected Science Highlights

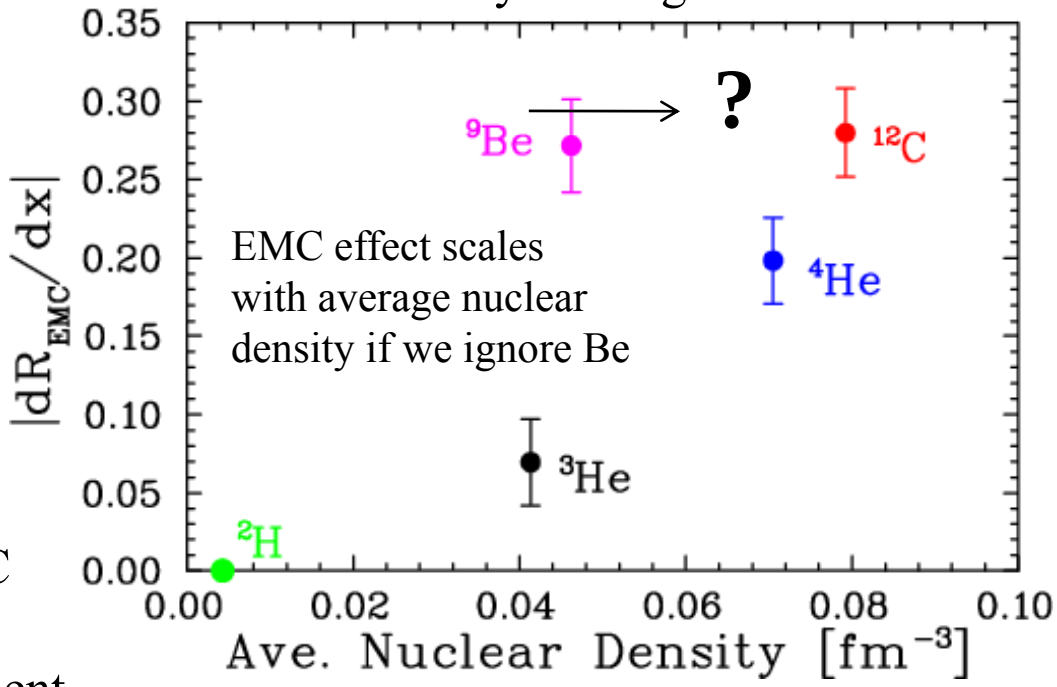




Be = 2 α clusters (^{4}He nuclei) + "extra" neutron. Suggests EMC effect depends on ***local*** nuclear environment

EMC Effect in Very Light Nuclei at TJNAF

EMC effect scales with average nuclear density if we ignore Be

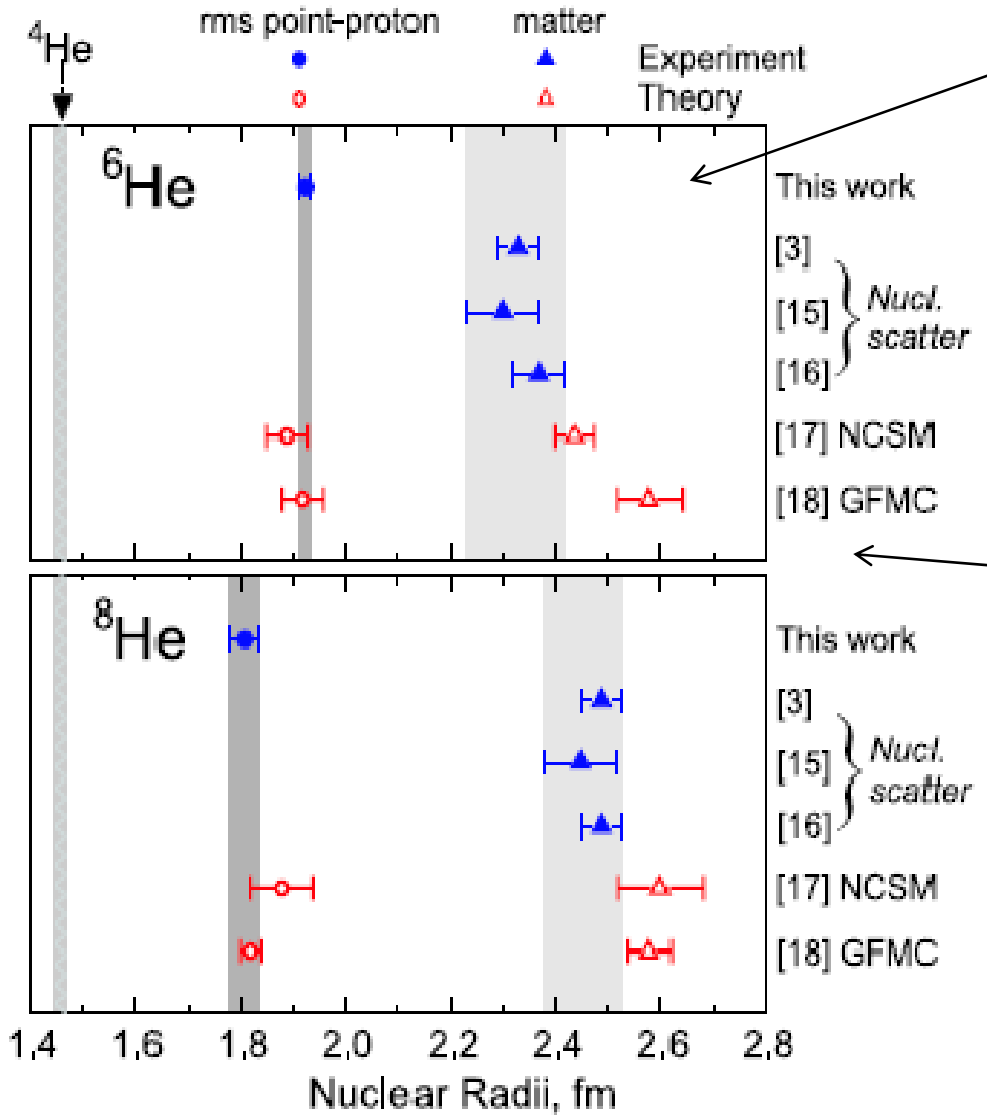


dR/dx = slope of line fit to A/D ratio over region x=0.3 to 0.7

Nuclear density extracted from ab initio GFMC calculation – scaled by (A-1)/A to remove contribution to density from "struck" nucleon

Selected Science Highlights

Technique: Isotope shifts measured in Atom Trap



ATLAS Program Thrusts

- Nature of Nucleonic Matter
- Origin of the Elements
- Tests of Fundamental Symmetries

Test of Ab-initio Calculations: Charge Radius ^{6}He and ^{8}He

^{6}He first measured at ATLAS

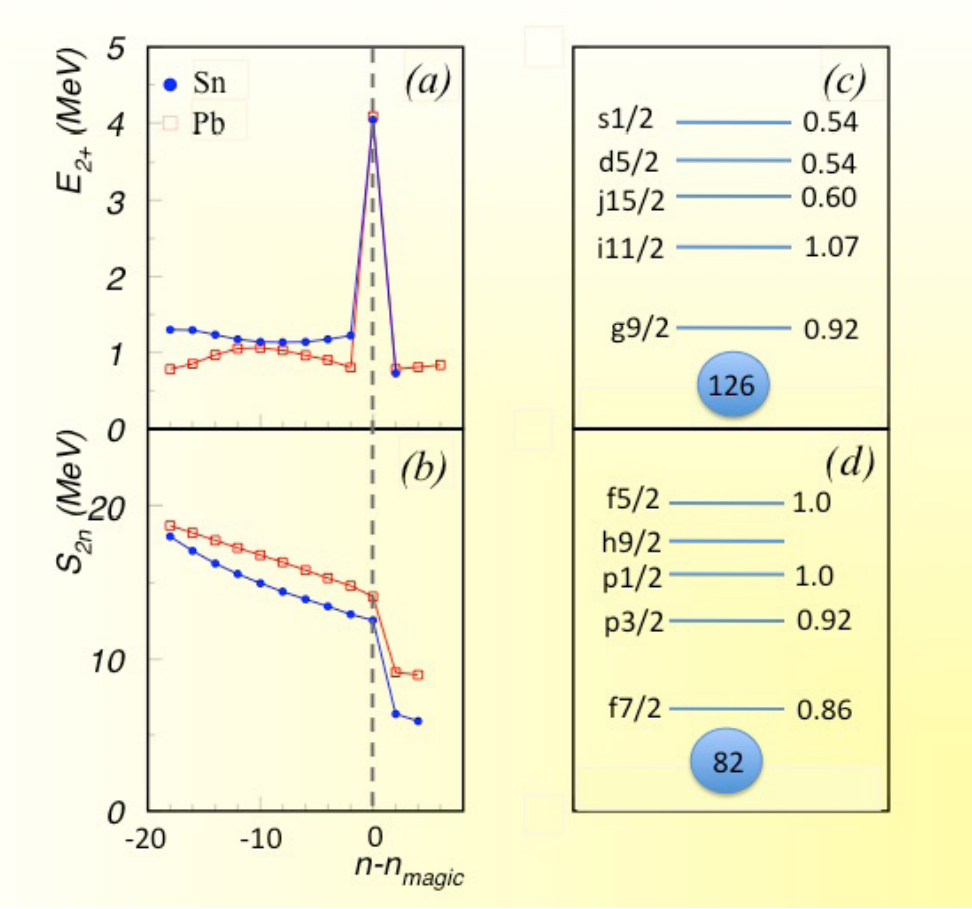
Re-measured at GANIL

^{8}He measured at GANIL

Latest publication:
P. Mueller et al., PRL 99, 252501 (2007)

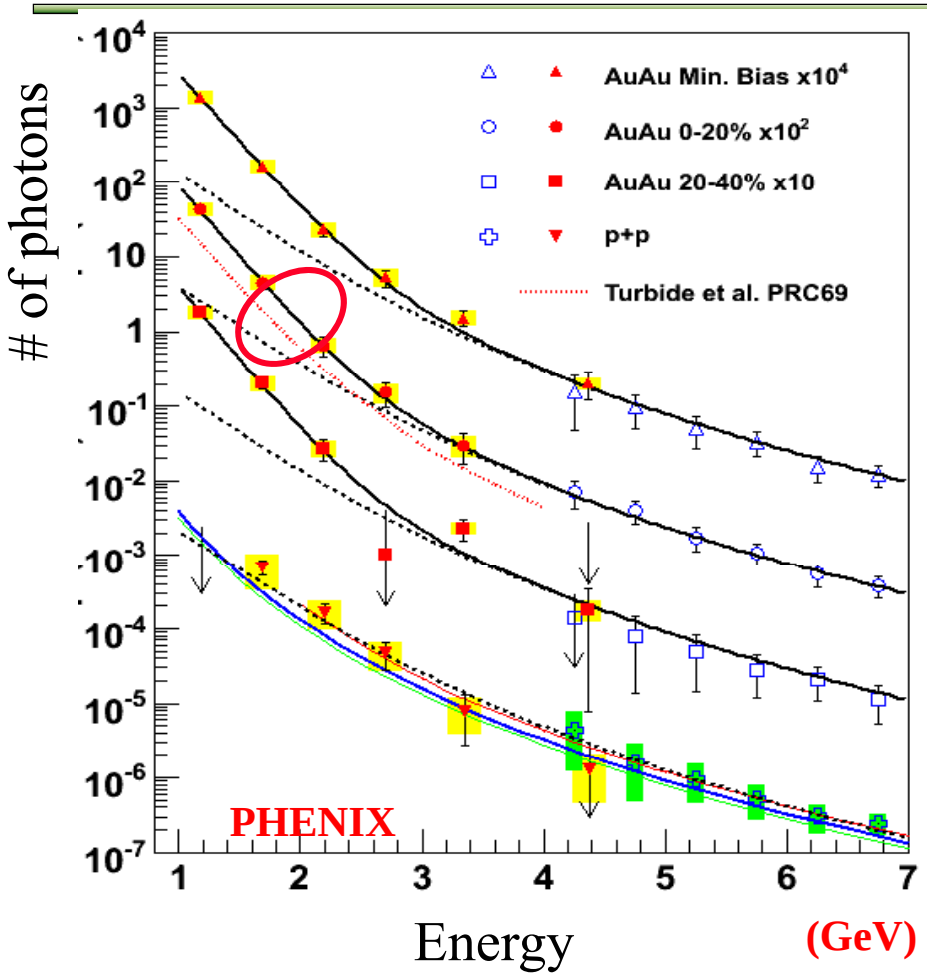
Selected Science highlights

At HRIBF



Observation of a new single particle state ^{133}Sn created by from a single neutron transfer reaction on doubly magic ^{132} Sn ($T_{1/2}$ = 39.7 s) at an excitation energy of 1363 KeV provides a new "laboratory" to test nuclear models used to extrapolate to exotic nuclei out of the range of current experiments

Selected Science Highlights

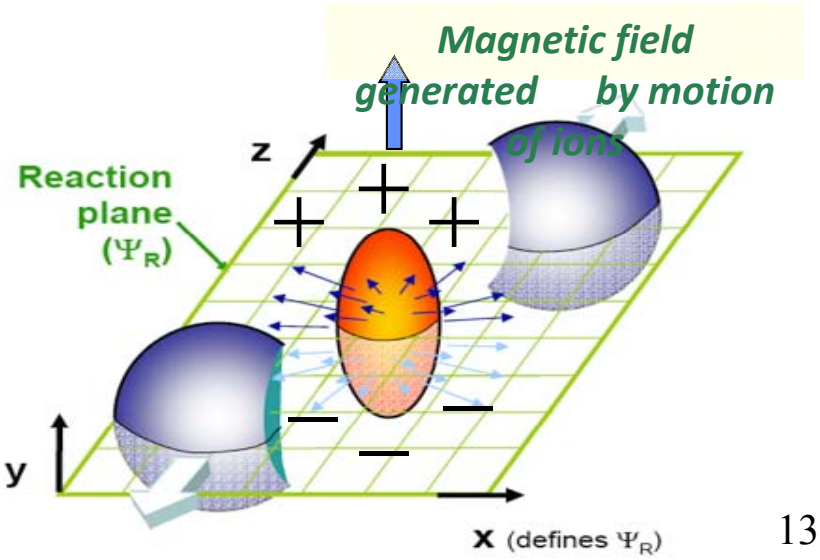


Heavy Ions at RHIC

Excess e^+e^- pairs at $M_{inv} < 300$ MeV and $p_T \sim$ (1-5 GeV) in Au+Au vis-à-vis p+p

Slope of excess ⇒ temp. averaged over time of virtual photon emission.

Match to hydrodynamic calculations ⇒ initial temp. ~ 4×10^{12} K ≈ 2x LQCD transition temperature ≈ 2x Hagedorn max T_{HG}

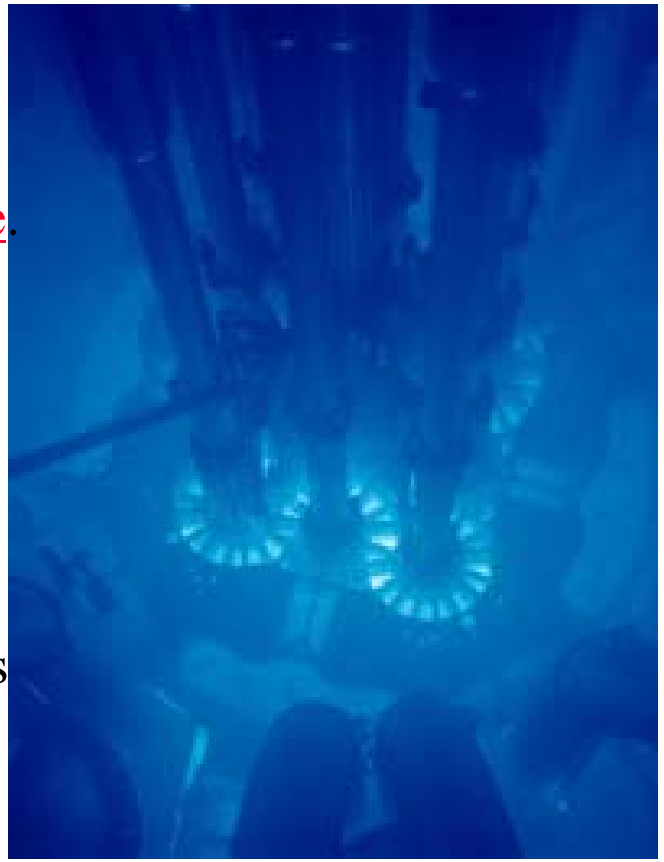


STAR observes event-by-event preference for like-sign (opposite-sign) charges to emerge in same (opposite) direction with respect to magnetic field produced by colliding nuclei

Applications for National needs supported by NP

New Idaho National Lab collaboration tackles nuclear fuel recycling science

IDAHO FALLS (Sept. 25, 2009) — A new research project at Idaho National Laboratory (INL) and Argonne National Laboratory willuse an innovative approach to learn how to get more use from nuclear fuel. Funding for this project will be provided by the Department of Energy's Office of Science. INL has won a competitive research grant that could help nuclear fuel be recycled or used for longer periods of time to produce more energy. The INL team in Idaho will Collaborate with scientists at the Argonne Tandem Linac A ccelerator System (ATLAS) user facility in Illinois….



INL researcher Gilles Youinou aims to give nuclear scientists a better understanding of how elements within fuel rods respond to neutron irradiation. "If we're going to recycle nuclear fuel or burn it longer, we need a clearer understanding of how the daughter products respond to neutron irradiation," said Youinou.

NSAC Committee of Visitors
January 6-10, 2010

Charge to Committee of Visitors

For both DOE laboratory and university programs and projects

- **Assess the effectiveness, efficiency and quality of:**
  - the processes used to solicit, review, recommend, and document proposal actions
  - the monitoring of active projects and programs

Within the boundaries defined by DOE missions and available funding

- **Assess the quality of the resulting portfolio including**
  - the breadth and depth of the Nuclear Physics portfolio elements
  - the national and international standing of the portfolio elements.

<u>Comment on:</u>

- **observed strengths or deficiencies in any component or sub-component of the Office's portfolio and opportunities for improvements**
- **progress made towards addressing action items from the previous COV Review.**

Report from the COV at this meeting

Science Early Career Research Awards Program

- **ECRA program is an Office of Science-wide early career program**
- **Purpose - support the development of individual research programs of outstanding scientists early in their careers in areas supported by SC**
- **Funding Opportunity Announcement - published July 2, 2009**
- **Applications - deadline September 1, 2009**
- **Programs for both university faculty and laboratory staff**
- **Applicant must have received Ph.D. in 1999 or later**

- **NP received 29 applications from university faculty and 26 from laboratory staff**
- **Rigorous process including mail and panel reviews for university and laboratory applicants separately was used as part of the selection process**
- **Applicants' scopes of research covered all subprogram areas supported by NP**

Science Early Career Research Awards
Announcement made on January 10, 2010

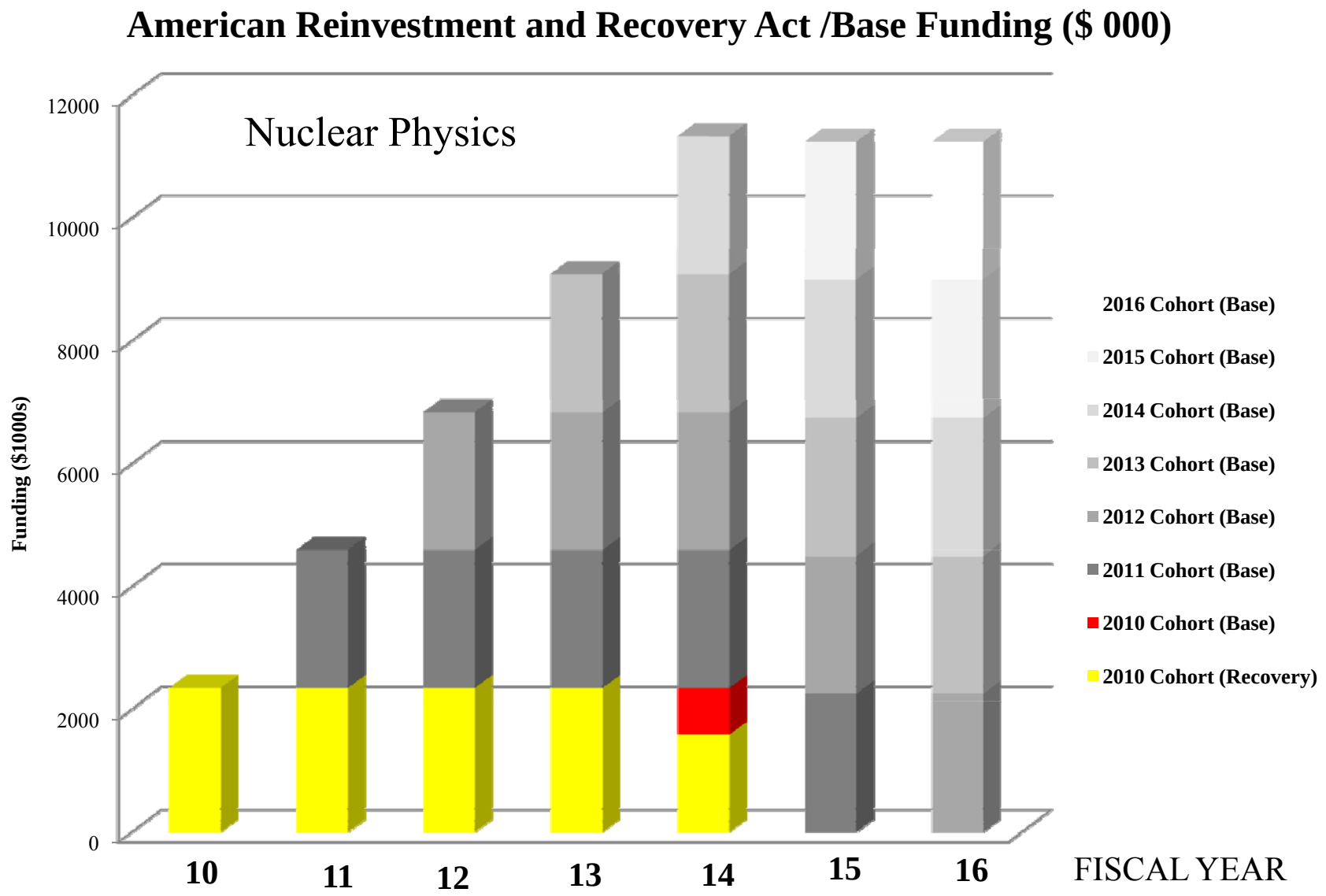
University Awards

• **Prof. Denes Molnar**	**Purdue University**	**Heavy Ion Theory**
• **Prof. Michael Kohl**	**Hampton University**	**Medium Energy Experiment**
• **Prof. Benjamin Monreal**	**University of California, Santa Barbara**	**Low Energy Experiment**
• **Prof. Christina Markert**	**University of Texas, Austin**	**Heavy Ion Experiment**
• **Prof. Xiaochao Zheng**	**University of Virginia**	**Medium Energy Experiment**

Laboratory Awards

• **Dr. Feng Yuan**	**Lawrence Berkeley National Laboratory**	**Theory of Nucleon Structure**
• **Dr. Tsuyoshi Tajima**	**Los Alamos National Laboratory**	**Accelerator Physics Experiment**
• **Dr. Daniel W. Bardayan**	**Oak Ridge National Laboratory**	**Nuclear Astrophysics Experiment**

Science Early Career Research Award Program funding



A continuing commitment to the ECRA Program is planned by SC

Program news in Nuclear Theory

National Lab Theory Program Review Sept. 16-18 , 2009 Reports out Jan, 2010

Funding Opportunity Announcement for Topical Theory Collaborations

Selection announced Dec 14, 2009

"Jet and Electromagnetic Tomography (JET) in Heavy-Ion Collisions "
Principal Investigator/Project Director: X-N. Wang (LBNL), eight collaborating institutions

"Advancing the Theory of Nuclear Reactions with Rare Isotopes: From the Laboratory to the Cosmos "
Principal Investigator/Project Director: I. Thompson (LLNL), four collaborating institutions

"Neutrinos and Nucleosynthesis in Hot and Dense Matter"
Principal Investigator/Project Director: S. Reddy (LANL), six collaborating institutions

Topical Collaborations are fixed-term, multi-institution collaborations established to investigate a specific topic in nuclear physics of special interest to the community, which is well aligned with programmatic NP goals.

Nuclear Physics Isotopes Program Update

- **Work continues on restructuring the Isotope Business Office to National Isotope Data Center (NIDC)**
  - Increased scope: coordinates and integrates multi-laboratory and university isotope production schedules; maintains isotope inventory balances and transportation container inventory and certifications; and conducts various outreach and societal activities.
  - Dr. Robert Atcher named as Head of the NIDC.

- **R&D program initiated in 2009 on alternative isotope production techniques is continuing.**

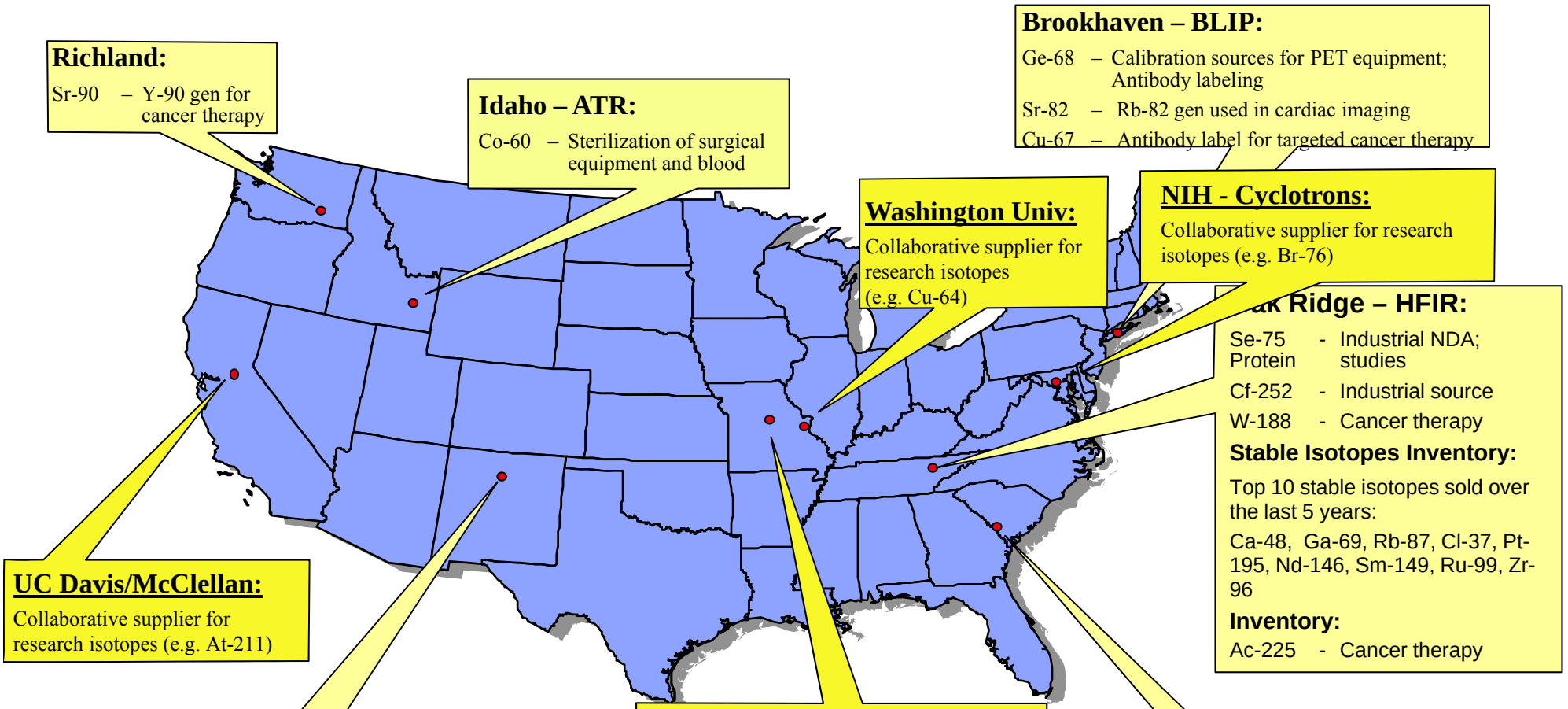
- **Pricing policy has been modified for research isotopes. Prices will be based on unit cost and not batch cost. Overall production cost was reduced.**

- **Established peer review mechanisms for facilities and initiatives.**

- **Establishing new production capabilities outside suite of NP/Isotope Program facilities – including other agency facilities and university facilities.**

- **NSACI report published which sets priorities for research opportunities and develops a long-term strategic plan for isotope production and development.**

Additional Production Sites Integrated into the DOE Isotope Program



Richland:
Sr-90 – Y-90 gen for cancer therapy

Idaho – ATR:
Co-60 – Sterilization of surgical equipment and blood

Brookhaven – BLIP:
Ge-68 – Calibration sources for PET equipment; Antibody labeling
Sr-82 – Rb-82 gen used in cardiac imaging
Cu-67 – Antibody label for targeted cancer therapy

Washington Univ:
Collaborative supplier for research isotopes (e.g. Cu-64)

NIH - Cyclotrons:
Collaborative supplier for research isotopes (e.g. Br-76)

Oak Ridge – HFIR:
Se-75 Protein - Industrial NDA; studies
Cf-252 - Industrial source
W-188 - Cancer therapy

Stable Isotopes Inventory:
Top 10 stable isotopes sold over the last 5 years:
Ca-48, Ga-69, Rb-87, Cl-37, Pt-195, Nd-146, Sm-149, Ru-99, Zr-96

Inventory:
Ac-225 - Cancer therapy

UC Davis/McClellan:
Collaborative supplier for research isotopes (e.g. At-211)

Columbia – MURR:
Collaborative supplier for research isotopes (e.g. As-72)

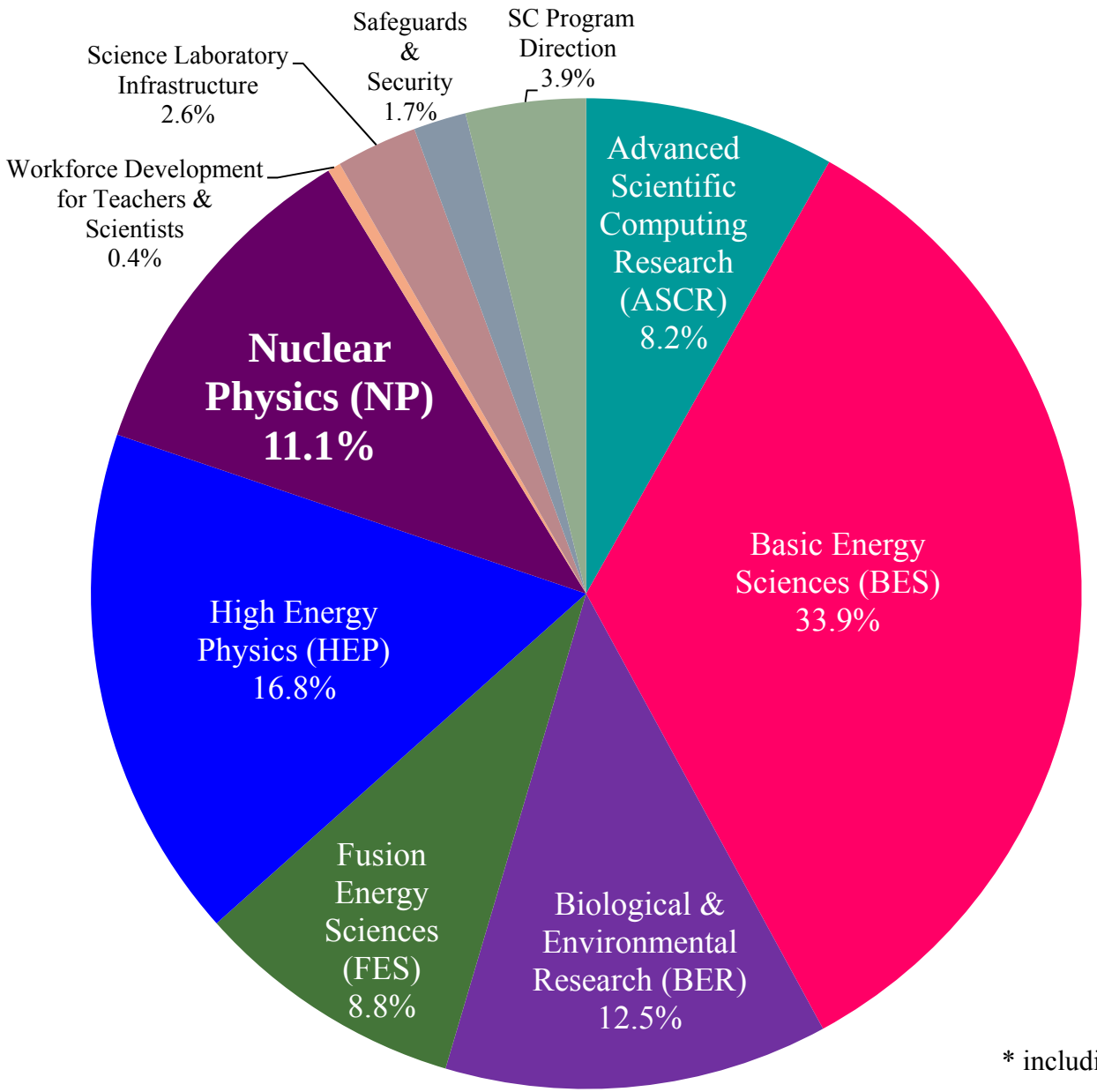
Los Alamos – LANSCE/IPF:
Ge-68 – Calibration sources for PET equipment; Antibody labeling
Sr-82 – Rb-82 gen used in cardiac imaging
As-73 – Biomedical tracer

Savannah River – Tritium Facility:
He-3 – Neutron detection
– Fuel source for fusion reactors
– Lung testing

NSAC Recommendations on the Isotope Program

- Maintain a continuous dialogue with all interested federal agencies and commercial isotope customers to forecast and match realistic isotope demand and achievable production capabilities.
- Coordinate production capabilities and supporting research to facilitate networking among existing DOE, commercial, and academic facilities.
- Support a sustained research program in the base budget to enhance the capabilities of the isotope program in the production and supply of isotopes generated from reactors, accelerators, and separators.
- Devise processes for the isotope program to better communicate with users, researchers, customers, students, and the public and to seek advice from experts.
- Encourage the use of isotopes for research through reliable availability at affordable prices.
- Increase the robustness and agility of isotope transportation both nationally and internationally.
- Invest in workforce development in a multipronged approach, reaching out to students, post-doctoral fellows, and faculty through professional training, curriculum development, and meeting/workshop participation.
- **Construct and operate an electromagnetic isotope separator facility for stable and long-lived radioactive isotopes.**
- **Construct and operate a variable-energy, high-current, multi-particle accelerator and supporting facilities that have the primary mission of isotope production.**

Office of Science Programs
FY 2010 Appropriation



FY 2010 Funding ($K)
Total = $4,903,710 *

ASCR, $394,000
BES, $1,636,500
BER, $604,182
FES, $426,000
HEP, $810,483
NP, $535,000
WDTS, $20,678
SLI, $127,600
S&S, $83,000
SCPD, $189,377

* including earmarks of $76,890k not reflected in pie chart

FY 2010 Nuclear Physics Funding

($ in thousands)

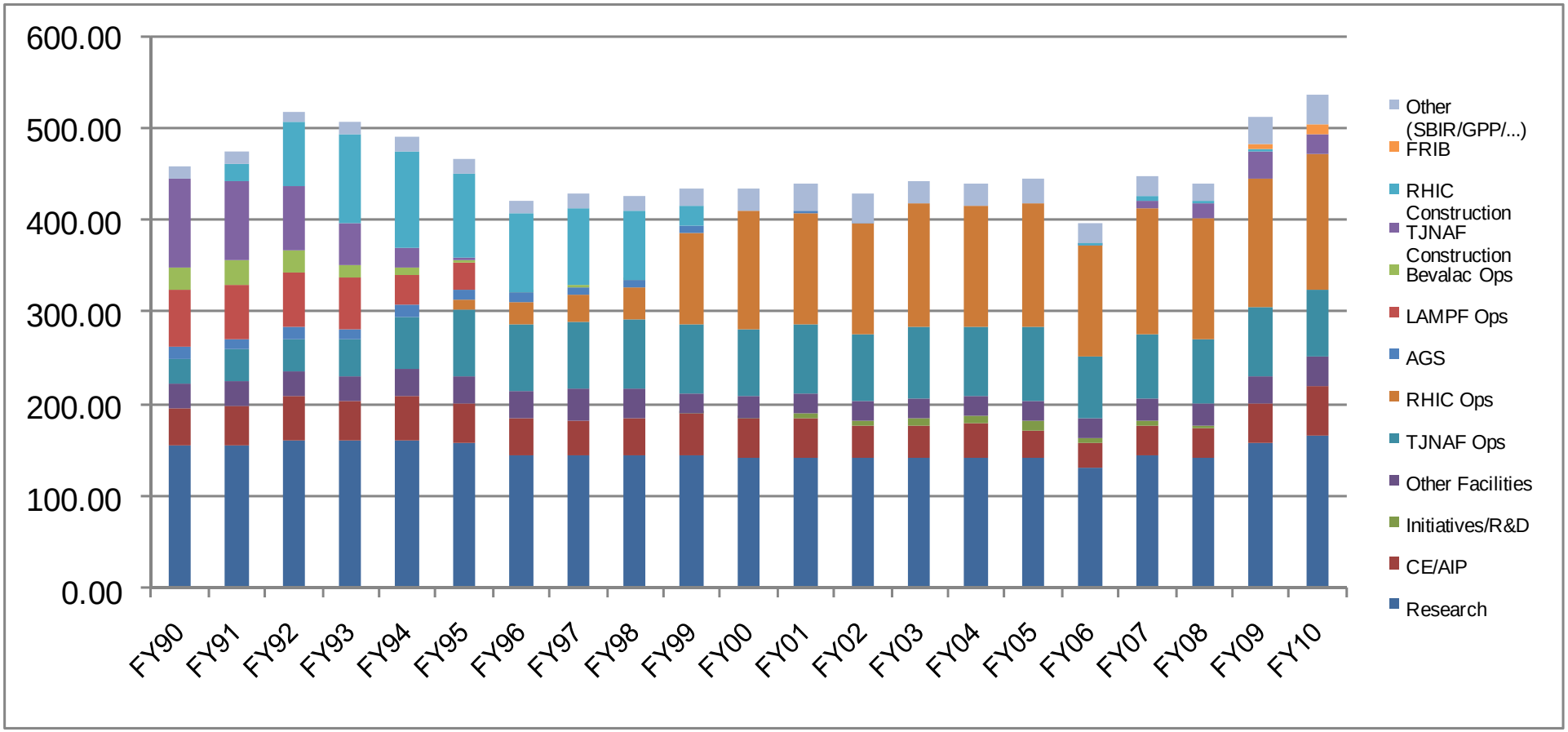
Nuclear Physics	FY 2007 Approp.	FY 2008 Approp.	FY 2009 Approp.	FY2009 ARRA	FY 2010 Approp.	FY10 Approp. vs. FY09 $	FY10 Approp. vs. FY09 %
Medium Energy Nuclear Physics	113,754	111,990	121,784	+15,390	127,590	+5,806	+4.8%
Heavy Ion Nuclear Physics	184,290	186,663	200,253	+12,669	212,000	+11,747	+5.9%
Low Energy Nuclear Physics	79,397	83,623	96,306	+29,667	114,636	+18,330	+19.0%
Nuclear Theory	33,205	34,411	37,776	+17,237	41,574	+3,798	+10.1%
Isotope Program	0	0	24,900	+14,837	19,200	-5,700	-22.9%
Subtotal, Nuclear Physics	410,646	416,687	481,019	+89,800	515,000	+33,981	+7.1%
Construction	12,120	17,539	31,061	+65,000	20,000	-11,061	-35.6%
Total, Nuclear Physics	**422,766**	**434,226**	**512,080**	**+154,800**	**535,000**	**+22,920**	**+4.5%**

* Includes SBIR/STTR in FY 2007-2009 for comparability

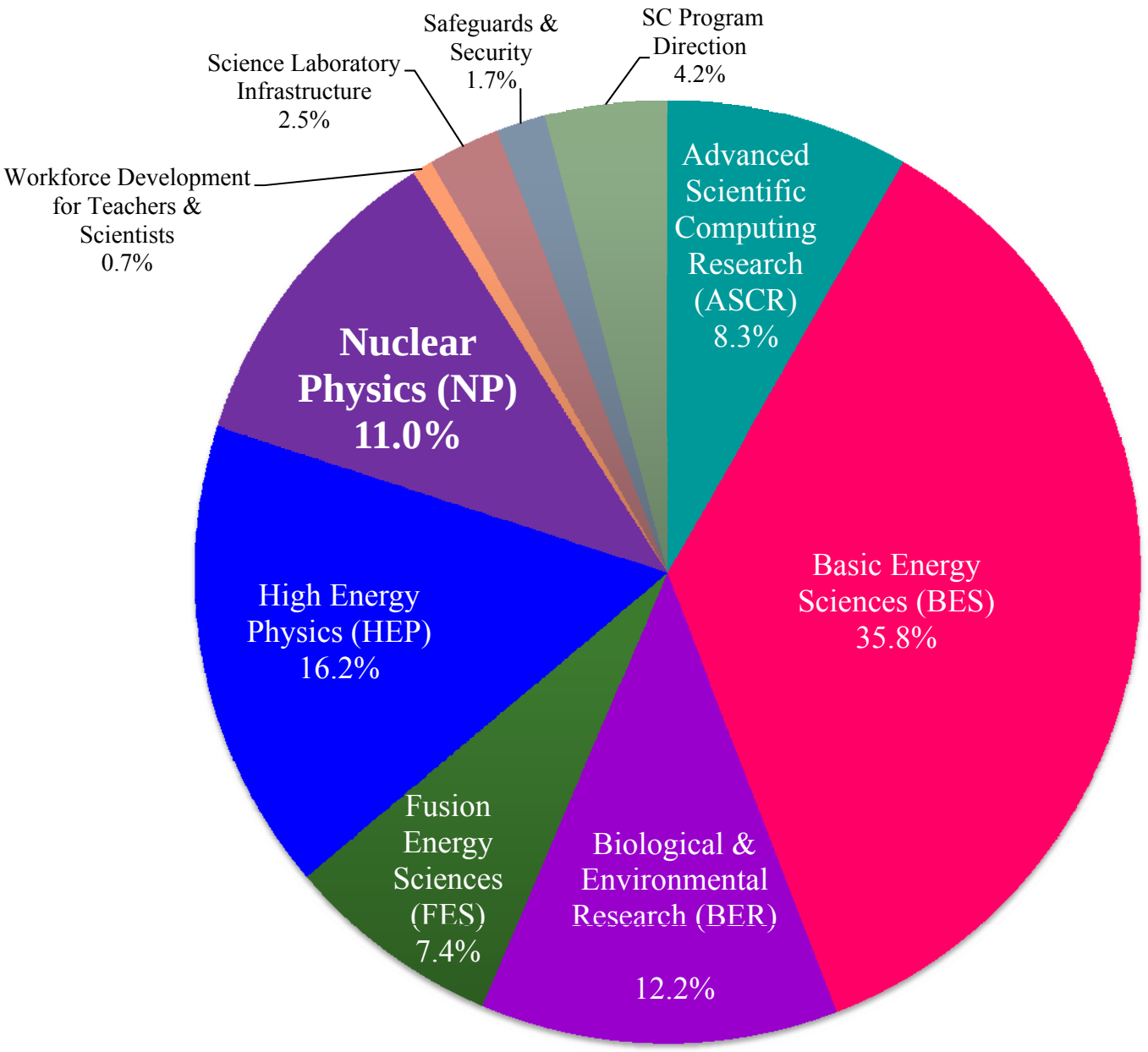
Funding History of the Nuclear Physics Program

Beginning in FY 2009, the Isotopes Program became part of the Nuclear Physics program

The FY 2010 Appropriation is $535M



Office of Science Programs
FY 2011 Congressional Request



FY 2011 Funding ($K)
Total = $5,121,437

ASCR, $426,000
BES, $1,835,000
BER, $626,900
FES, $380,000
HEP, $829,000
NP, $562,000
WDTS, $35,600
SLI, $126,000
S&S, $86,500
SCPD, $214,437

Nuclear Physics
FY 2011 Congressional Request

	FY 2009 Approp.	FY2009 ARRA	FY 2010 Approp.	FY 2011 Request	FY11 Request vs. FY10 Approp. $	FY11 Request vs. FY10 Approp. %
Medium Energy Nuclear Physics	116,873	+15,390	127,590	129,610	+2,020	+1.6%
Heavy Ion Nuclear Physics	194,957	+12,669	212,000	218,435	+6,435	+3.0%
Low Energy Nuclear Physics	94,880	+29,667	114,636	113,466	-1,170	-1.0%
Nuclear Theory	37,776	+17,237	41,574	44,709	+3,135	+7.5%
Isotope Program	24,760	+14,837	19,200	19,780	+580	+3.0%
Subtotal, Nuclear Physics	469,246	+89,800	515,000	526,000	+11,000	+2.1%
Construction	31,061	+65,000	20,000	36,000	+16,000	+80.0%
Total, Nuclear Physics *	**500,307**	**+154,800**	**535,000**	**562,000**	**+27,000**	**+5.0%**

- **Investments in the core program are constrained as support for construction projects increase**
- **Trends in funding in research programs driven by investments in instrumentation profiles**
- **The FRIB construction project is funded with operating funds in the low energy budget**

* SBIR/STTR for FY 2009 was $11,773k. Comparable NP total w/SBIR/STTR in FY 2009 is $512,080k.

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Major Items of Equipment
FY 2011 Congressional Request

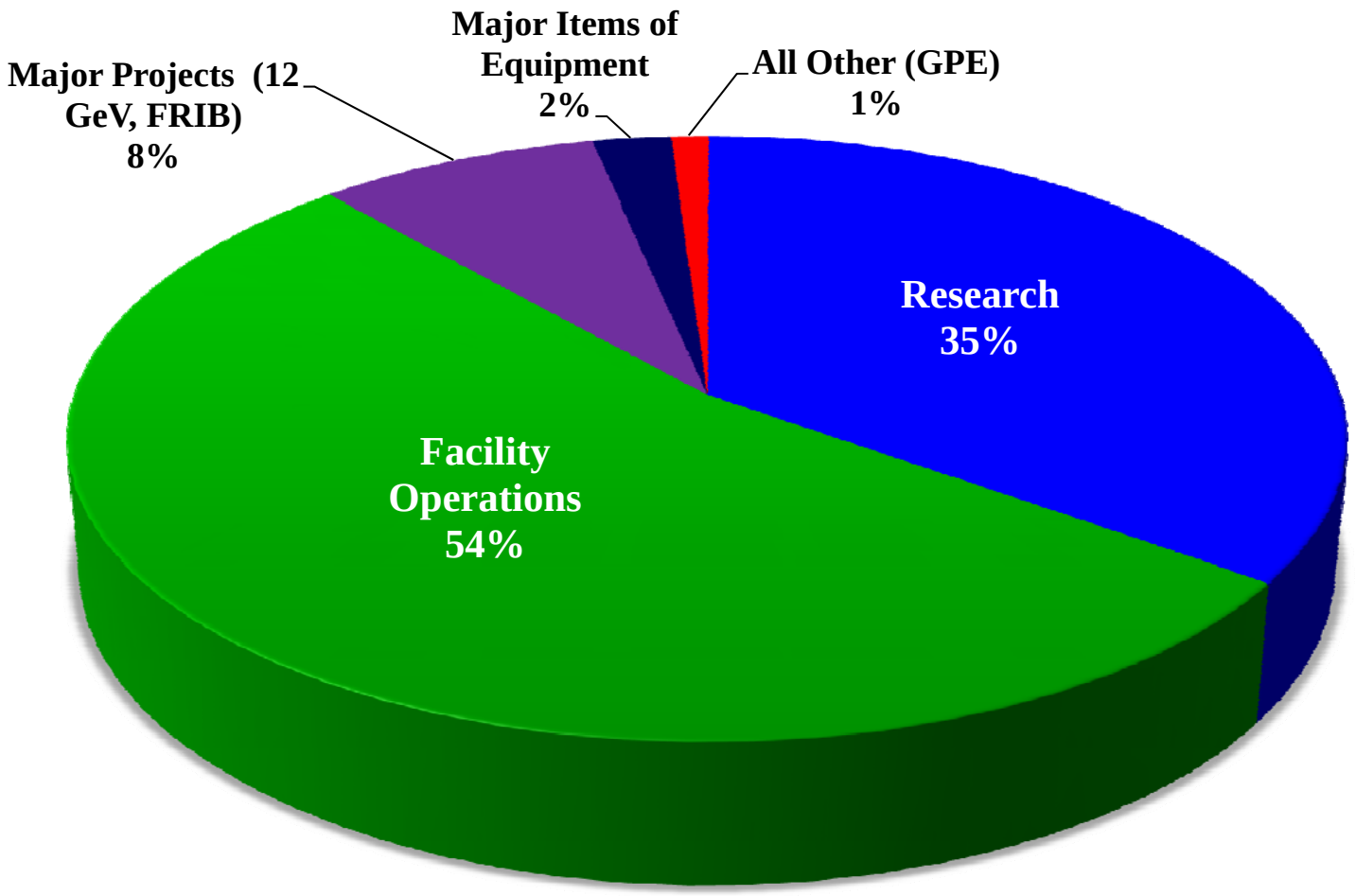
	FY 2009 Approp.	FY2009 ARRA	FY 2010 Approp.	FY 2011 Request
Heavy Ion MIEs				
Heavy Ion LHC Experiments (EMCal for ALICE)	4,000	…	5,000	1,205
PHENIX Silicon Vertex Tracker	851	+250	…	…
PHENIX Forward Vertex Detector	2,200	+2,000	…	…
STAR Heavy Flavor Tracker	…	…	1,400	2,900
Total Heavy Ion MIEs	**7,051**	**+2,250**	**6,400**	**4,105**
Low Energy MIEs				
GRETINA Gamma-Ray Detector	2,300	…	730	…
Fundamental Neutron Physics Beamline (FNPB)	1,500	+600	…	…
Neutron Electric Dipole Moment (nEDM)	1,100	…	4,500	2,900
Cryogenic Underground Observatory for Rare Events (CUORE)	3,112	…	3,088	800
Rare Isotope Beam Science Initiatives	…	…	4,200	5,000
Total Low Energy MIEs	**8,012**	**+600**	**12,518**	**8,700**
TOTAL MIEs (TPC)	**15,063**	**+2,850**	**18,918**	**12,805**

FY 2011 Congressional Request Highlights

TOTAL INCREASE FOR NUCLEAR PHYSICS	$27,000
• **12 GeV Upgrade** – per planned construction profile	+ 16,000
• **Research** at national laboratories and universities essentially maintains constant effort across the program; slow build-up of user community for new experimental Hall D at CEBAF; supports data collection at RHIC with STAR and PHENIX, and research at LHC; addresses critical staff shortages at low energy facilities; and provides an increase for topical theory collaborations and for the National Nuclear Data Center.	+ 9,302
• **Majorana Demonstrator R&D ramps up** – effort to demonstrate proof-of-principle for neutrino-less double beta decay, initiated in FY 2010; according to project profile	+ 1,700
• **Scientific user facilities** - operate near optimal levels RHIC - 3,720 hours (91% of optimal) CEBAF - 4,090 hours (100% of maximum level with 12 GeV schedule) HRIBF - 5,200 hours – commissioning new accelerator components (85% of optimal) ATLAS - 5,900 hours – commissioning new accelerator components (89% of optimal)	+ 7,186
• **FRIB** – engineering and design initiated per Cooperative Agreement with MSU (decrease is a result of FY 2010 Congressional plus-up)	- 2,000
• **FY 2010 MIEs ramp-up:**	
• **STAR HFT** – needed for RHIC high luminosity run in FY 2013	+ 1,500
• **RIB Science Initiatives** – forefront science opportunities around the world	+ 800
• **All other MIE funding** - decreases as several projects complete or ramp-down	- 8,413
• **Other** - maintains effort in other parts of the program, including an increase for cost of living for isotope production facilities	+ 925

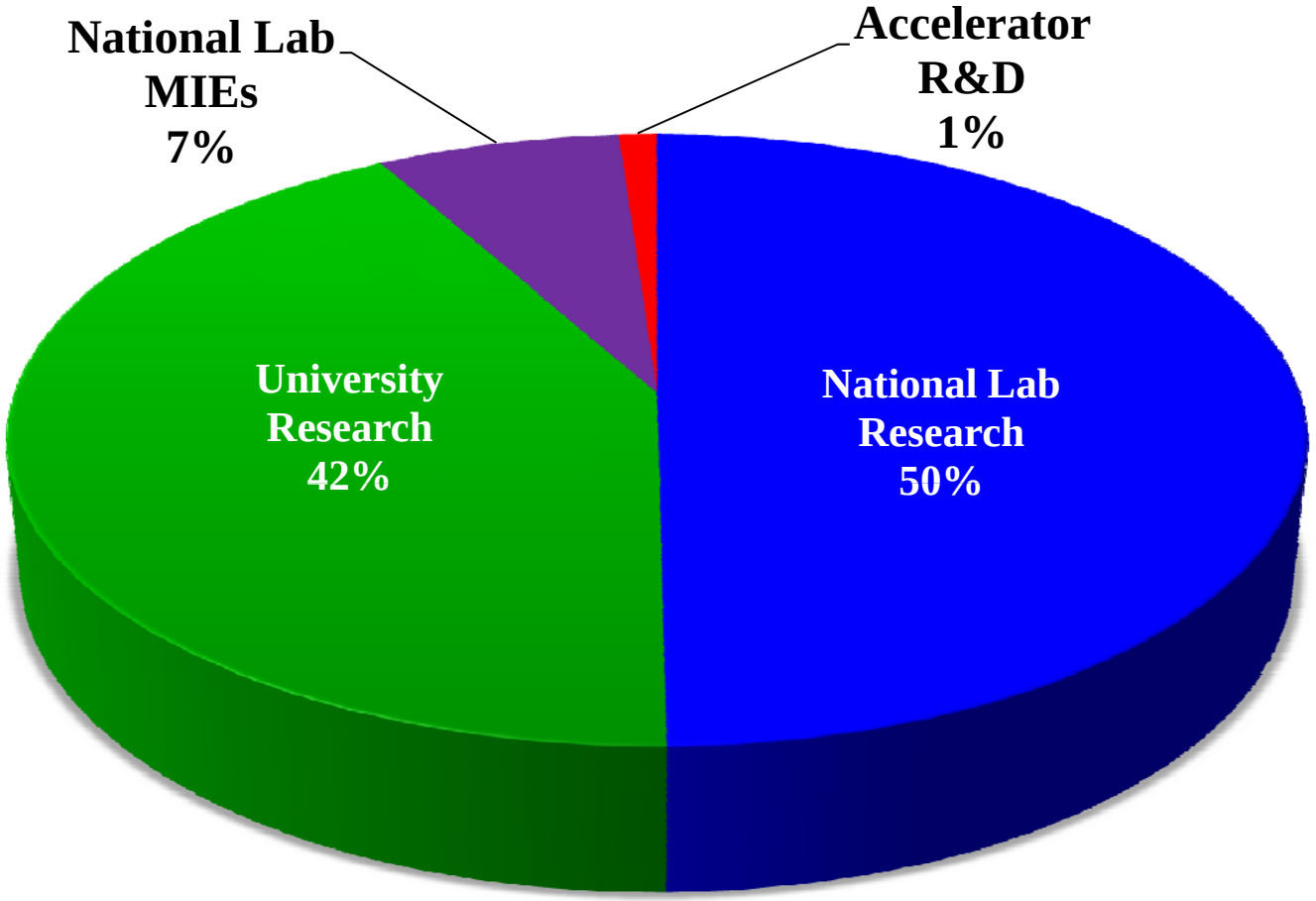
FY 2011 Congressional Request
Nuclear Physics by Major Function

65% of the NP budget supports operations or construction of facilities & instrumentation



FY 2011 Congressional Request
Total = $562.0M

FY 2011 Congressional Request
Nuclear Physics Research

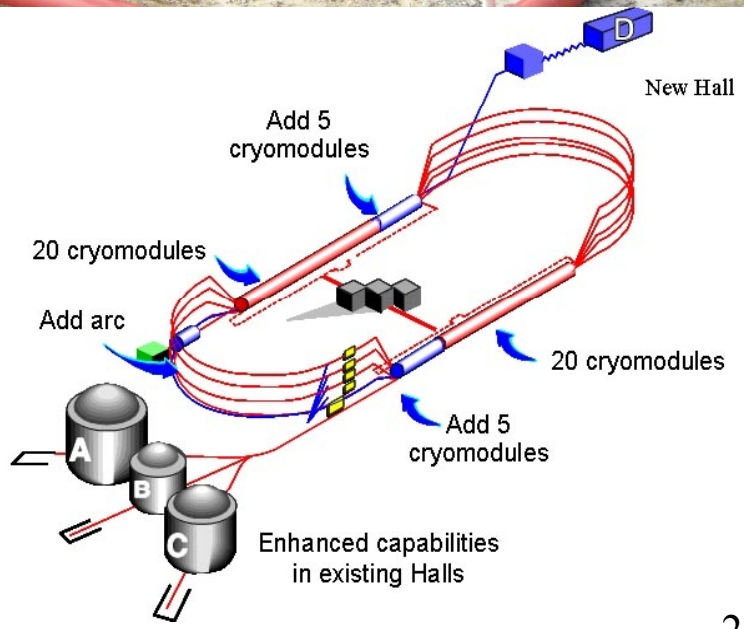


FY 2011 Congressional Request
Research Total = $182.2M
(excluding SBIR/STTR)
with SBIR/STTR total = $196.2M

Implementing the recommendations of the Long Range Plan

New physics reach provided by the 12 GeV CEBAF Upgrade:

- Nuclear tomography to discover and explore the three-dimensional structure of the nucleon
- The search for exotic mesons—a quark and an anti-quark held together by gluons, but unlike conventional mesons, the gluons are excited
- Physics beyond the Standard Model via high precision studies of parity violation
- The spin and flavor dependence of valence parton distributions—the heart of the proton, where its quantum numbers are determined
- The structure of atomic nuclei, exploring how the valence quark structure is modified in a dense nuclear medium



Implementing the recommendations of the Long Range Plan

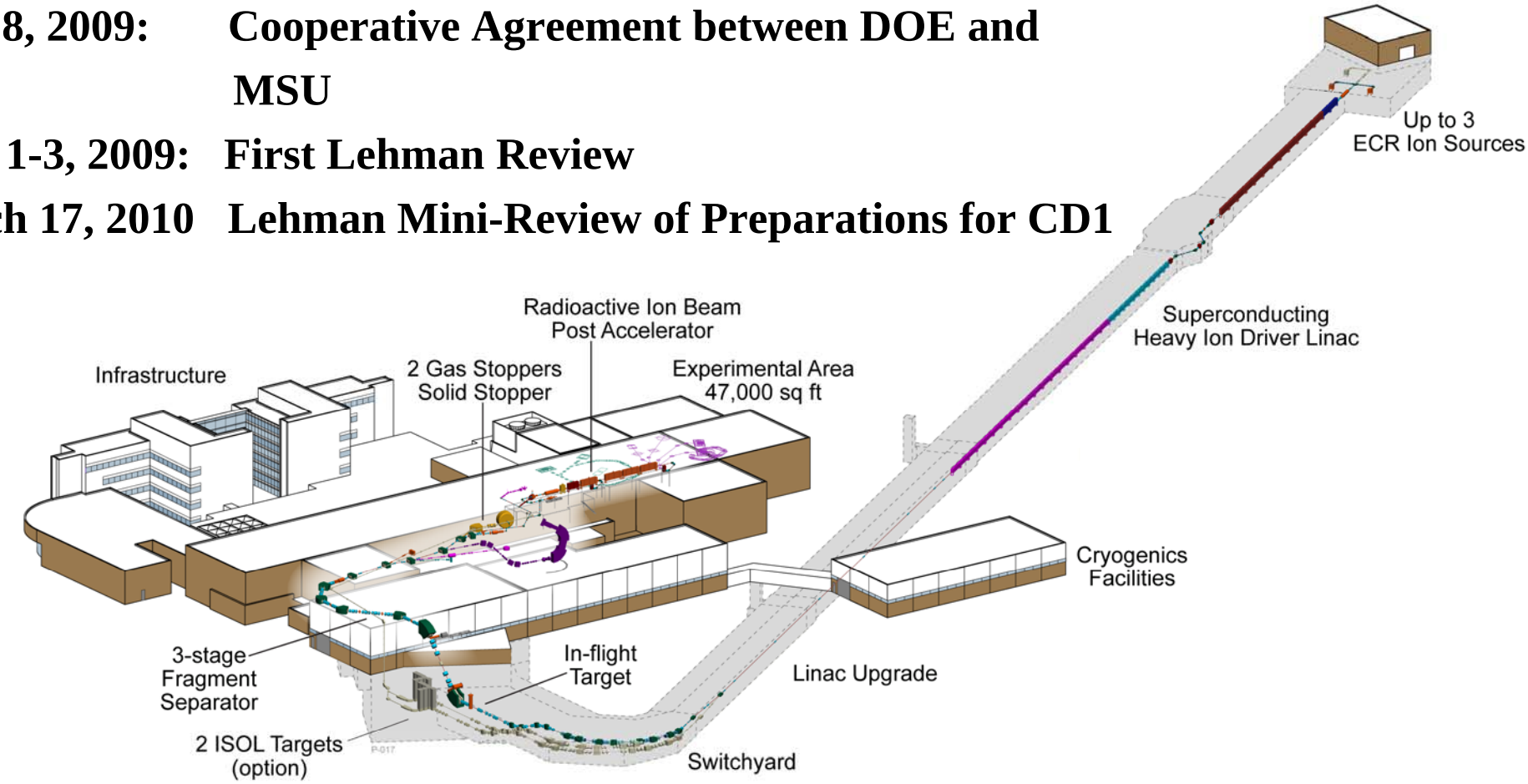
Dec. 11, 2008: DOE selects MSU to establish FRIB

May 7, 2009: Roll-out of NSCL/FRIB organization

June 8, 2009: Cooperative Agreement between DOE and MSU

Sept. 1-3, 2009: First Lehman Review

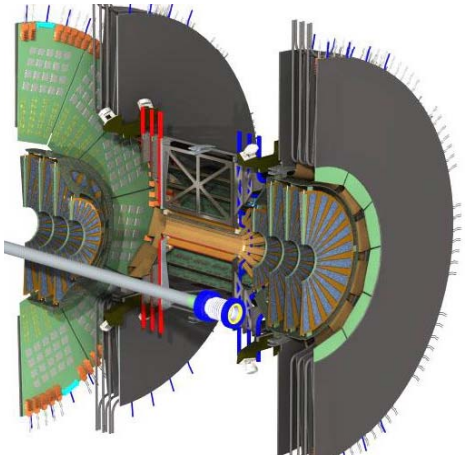
March 17, 2010 Lehman Mini-Review of Preparations for CD1



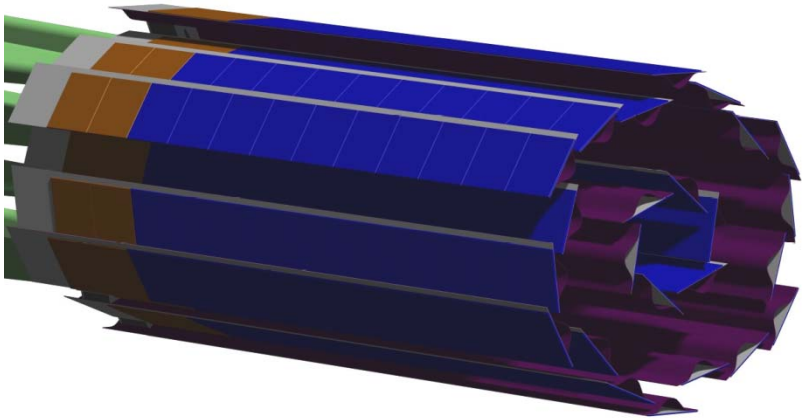
Expect to request the start of engineering design in FY 2011

Implementing the recommendations of the Long Range Plan

Luminosity and detector upgrades are underway for RHIC

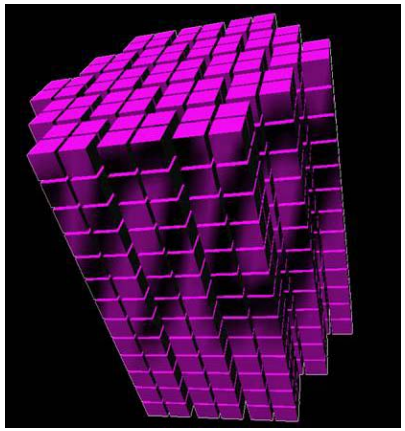


PHENIX Barrel and Forward Vertex Detector

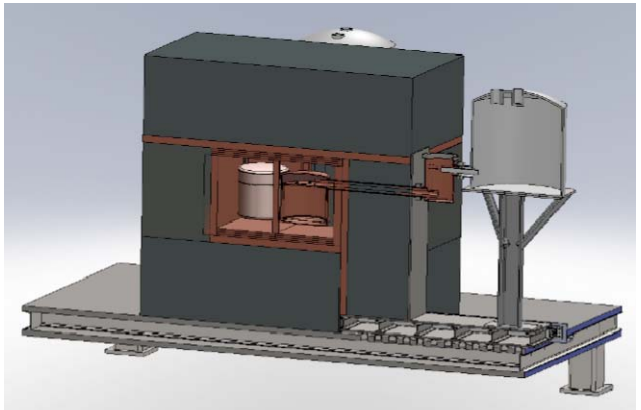


STAR Heavy Flavor Tracker

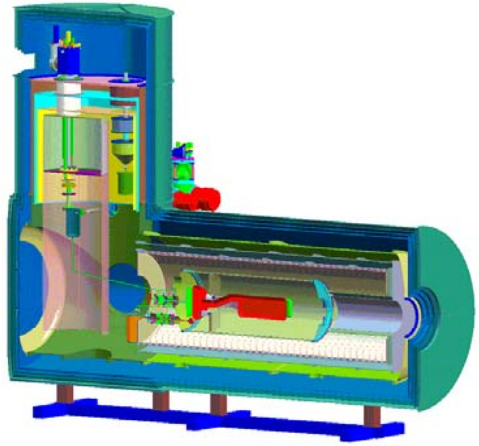
Investments in neutrons, neutrinos, and fundamental symmetries



CUORE receives CD2/3



Majorana Demonstrator Underway



R&D for nEDM

NP Sponsored Advances in Technology

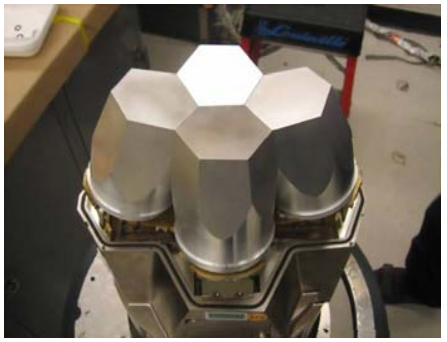
ANL accelerates exotic isotopes:

- CARIBU uses californium-252 to produce rare, exotic isotopes near limit of stability to study formation of elements
- Fission products may be reaccelerated to high velocities

Isotope	Half-life (s)	Low-Energy Beam Yield (s^{-1})	Accelerated Beam Yield (s^{-1})
^{104}Zr	1.2	$1.5x10^3$ / $4.8x10^4$ / $6.0x10^5$	$5.3x10^1$ / $1.7x10^3$ / $2.1x10^4$
^{143}Ba	14.3	$3.0x10^4$ / $9.6x10^5$ / $1.2x10^7$	$1.1x10^3$ / $3.4x10^4$ / $4.3x10^5$
^{145}Ba	4.0	$1.4x10^4$ / $4.4x10^5$ / $5.5x10^6$	$5.0x10^2$ / $1.6x10^4$ / $2.0x10^5$
^{130}Sn	222.	$2.5x10^3$ / $7.8x10^4$ / $9.8x10^5$	$9.0x10^1$ / $2.9x10^3$ / $3.6x10^4$
^{132}Sn	40.	$9.3x10^2$ / $3.0x10^4$ / $3.7x10^5$	$3.5x10^1$ / $1.1x10^3$ / $1.4x10^4$
^{138}Xe	846.	$2.5x10^4$ / $7.8x10^5$ / $9.8x10^6$	$1.8x10^3$ / $5.8x10^4$ / $7.2x10^5$
^{110}Mo	2.8	$1.6x10^2$ / $5.0x10^3$ / $6.2x10^4$	$5.8x10^0$ / $1.8x10^2$ / $2.3x10^3$
^{111}Mo	0.5	$8.3x10^0$ / $2.6x10^2$ / $3.3x10^3$	$0.3x10^0$ / $9.6x10^0$ / $1.2x10^2$

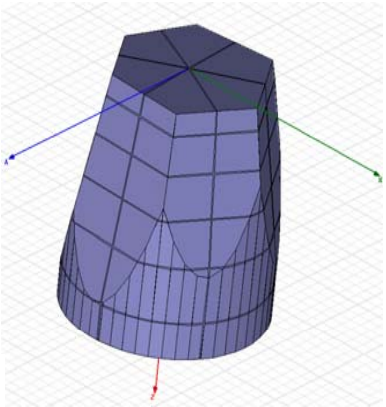
Tracking of low-energy gamma rays in highly-segmented, high-resolution Germanium crystals:

- Four-crystal detector modules of the Gamma-Ray-Energy-Tracking-In-Beam-Nuclear-Array (GRETINA)
- Each encapsulated crystal segmented 36 ways (6 longitudinal, 6 transverse); measures γ interaction point in 3 dimensions



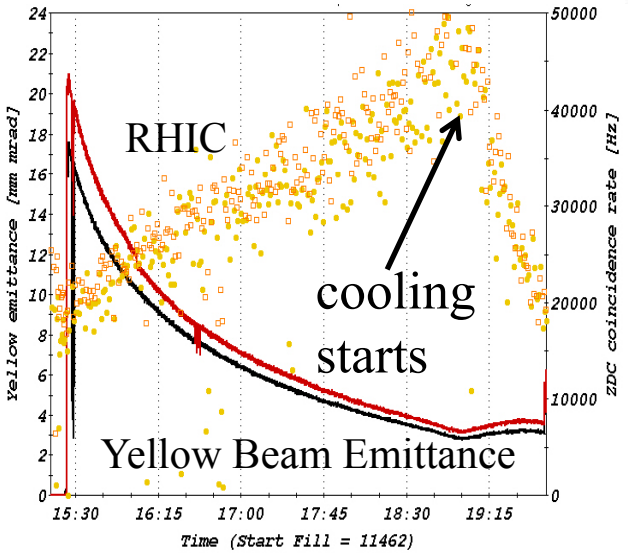
TJNAF continues advances in superconducting radio frequency (SRF) technology, cryogenics, instrumentation.

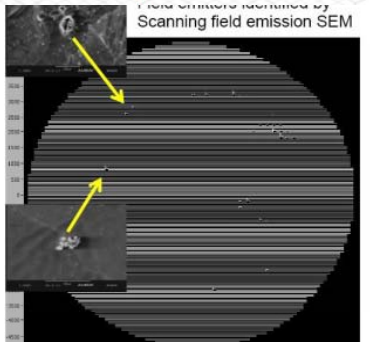
- Improved electro-polishing process leading to substantially improved cavity performance
- CEBAF has achieved full 6 GeV beam energy operations after successful cavity refurbishment program.
- CERN LHC is looking at using lab's Ganni cycle to achieve desired Temperature-Entropy operating point.



Stochastic cooling improves luminosity at RHIC

- Longitudinal and transverse cooling demonstrated at 100 GeV/nucleon in RHIC, counteracting IBS.
- Longitudinal and vertical cooling installed in both rings. Horizontal cooling under construction, to be competed for Run-12.

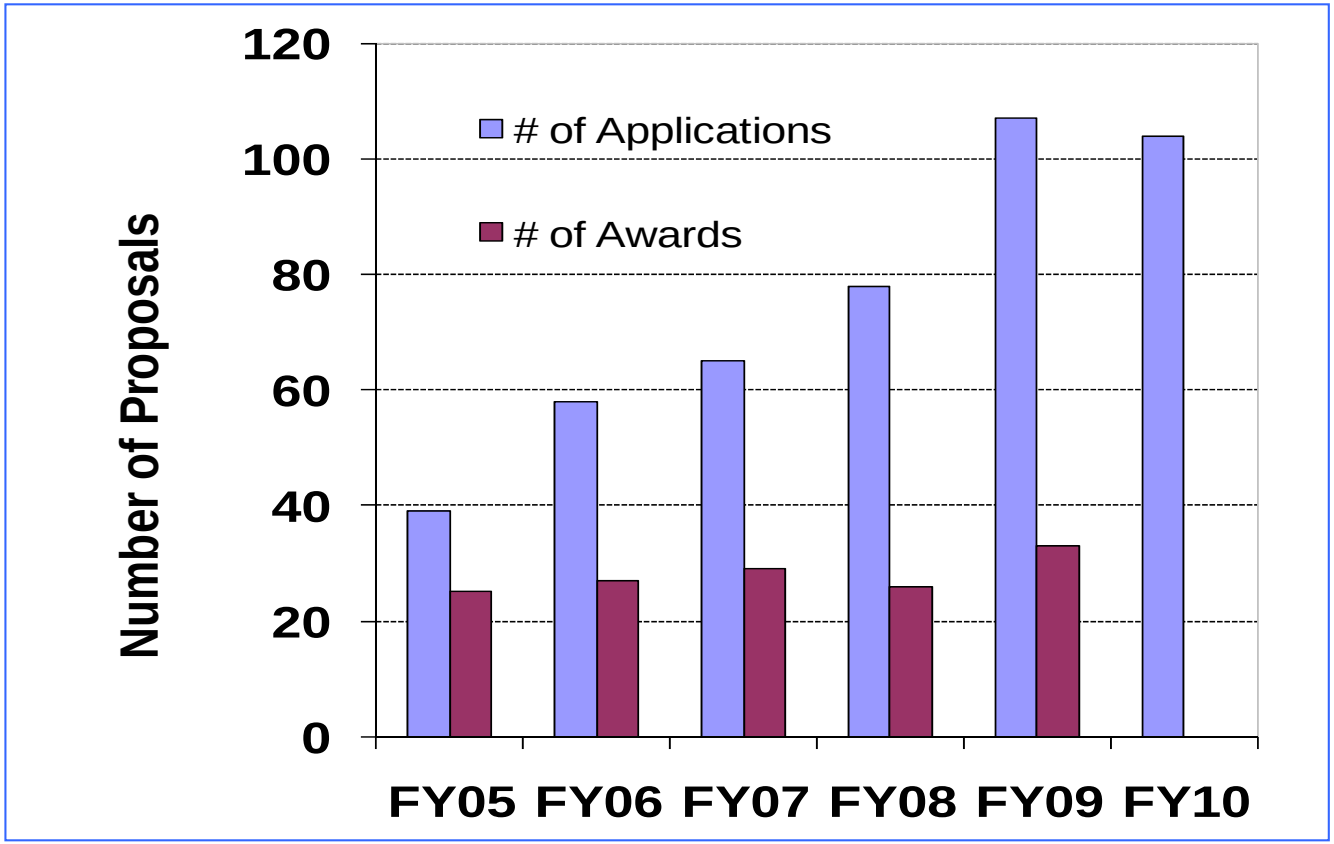




Using SEM to study cavity surface at TJNAF

Update on Small Business Innovation Research (SBIR) and Small Technology Transfer (STTR) Innovation Research

- Increase in number of SBIR/STTR proposal submissions through
  - Improved annual solicitation with increased interactions / input from the NP community
  - Increased collaboration between NP community and small business
  - Site visits of SBIR companies



Blue Sky Electronics, LLC, STAR TOF electronics: , 2003 Phase II "A Time-of-Flight Data Acquisition System for Ultra-Fast Particle Detectors" for STAR TOF.

Sienna Technologies, Inc. , 2003, Phase II: "**Hermetic Metallization of Aluminum Nitride for Radio Frequency Devices**" , Alternative to the BeO windows for industry, government, national labs and universities.

Aculight Corp, 2007 Phase II "100 Watt Laser for Synchronous Photo-injection", Possible use for diamond cathode amplifier photo-injector for ERL R&D

Radiation Monitoring Devices , Inc. , 2002 Phase II "A Novel Position Sensitive Detector for Nuclear Radiation" , position sensitive APD for NP, medical imaging, geological exploration, CT imaging, x-ray instrumentation, space physics, and materials analysis.

Examples of current developments:

- **Niowave Incorporated,** 2008 Phase II "Development of a Low Frequency Superconducting RF Electron Gun",
- **Nonlinear Ion Dynamics, LLC**. 2009 Phase II "Mirror-Enhanced Plasma Separation Process (MPSP) for Production of Large Quantities of Isotopes " an Alternative method for producing ^{76}Ge isotope for MAJORANA.
- **PHD's Co. ,** 2009 Phase II "High-Purity Germanium Crystals for Low Background Counting Arrays".
- **Tech-X Co., 2009 Phase II,** "Designing a Coherent Electron Cooling System for High-Energy Hadron Colliders",
- **Radiation Monitoring Devices , Inc,** 2009 Phase II**,** "Optical Detector with Integrated ADC for Digital Readout"

Outlook

The 2011 Request allows for Nuclear Science to continue what it is doing very well:

- Delivering discovery science and forefront advances in technology
- Providing opportunities and training to advance the next generation of scientists
- Meeting the highest priority National needs for production and R&D on rare isotopes for research, medicine and national security
- Developing new research tools that will provide new capability and maintain US leadership

In the out-years:

- The field will face challenges
- A unique strength of nuclear science has been the ability to work closely together to insure compelling research and technical developments
- That ability will continue to serve the community well

Office of Nuclear Physics Staff

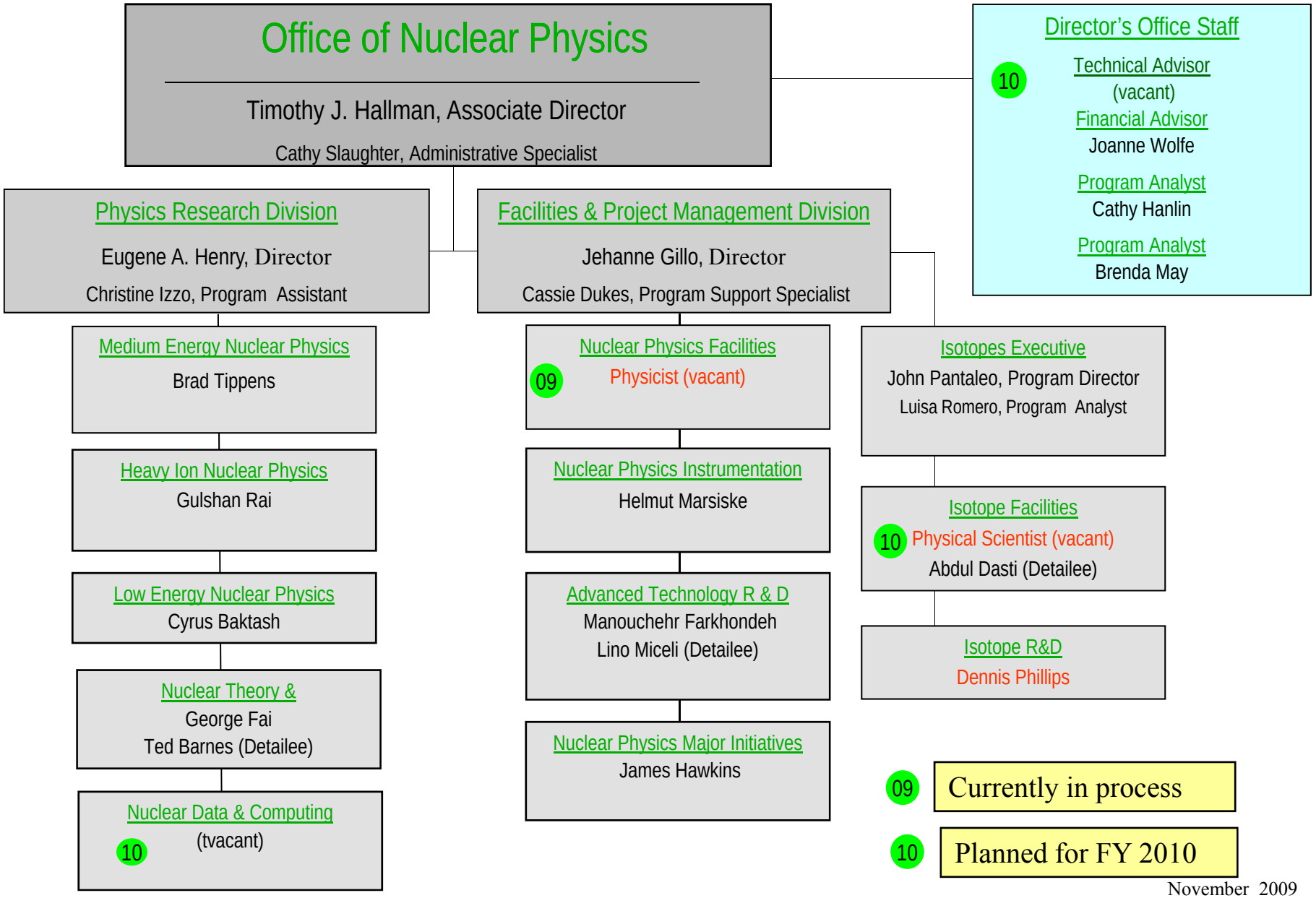
Changes in Office of Nuclear Physics

- Program Manager for NP National User Facilities – Candidate identified
- Program Manager for Nuclear Data and Computing – to be advertised
- Technical Advisor – to be advertised
- Program Manager for Research Isotopes – Position filled, Dennis Phillips
- Program Manager for Isotope Facilities – Position re-advertised
- Associate Director— Position Filled

Detailee/IPA positions

– We do have openings - please contact myself, Jehanne Gillo or Gene Henry

Office of Nuclear Physics



Backup Slides

NP Review Process for Early Career Award Selection

- **NP used a two part review process, a technical review by mail followed by a panel review**
- **Mail reviewers were each sent 3-5 applications and were requested to:**
  - Provide a written report evaluating the proposals against the FOA criteria
  - Provided descriptive and numerical ratings: Strongly Encourage Funding (5-6); Encourage Funding (3-4); and Discourage Funding (1-2)
- **Two panels were organized, one for university applicants and one for laboratory applicants with nine members each as well as an NP moderator**
- **Panelists were assigned as first and second readers for each application**
- **Panelists had access to mail technical reviews**
- **Following discussions of each application, panelists individually provided descriptive ratings and rated the applications on a scale from 1 (lowest) to 6 (highest)**
- **After extensive discussion, a down select to the top 12 applications was made**
- **Panelists individually ranked the top proposals 1 to N; relative rankings were discussed**
- **Panelists provided final individual rankings**
- **Panelists each provided a report supporting their evaluations**
- **NP managers utilized the mail reviews, panel evaluations, and program factors to arrive at the recommendations for early career awards for NP;**

NSAC Committee of Visitors
January 6-10, 2010

Success rate of OJI proposals by gender

	FY 2007		FY 2008		FY 2009		Total	
	Male	Female	Male	Female	Male	Female	Male	Female
Awarded	4	0	2	1	1	2	7	3
Declined	12	3	9	4	14	4	35	11

Awarded/Total = 17% 21%

Averaging over the entire NP Program

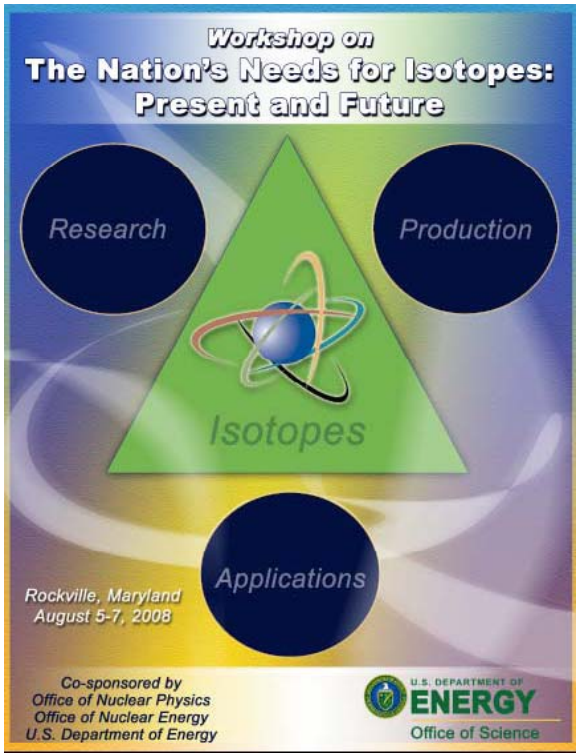
Percentage of funding granted versus request = 0.82 0.79

Isotope Development and Production for Research and Applications Subprogram

- **Supplies radioisotopes and stable isotopes for research and applications for the Nation**
  - Transferred from the Office of Nuclear Energy to NP with the 2009 Appropriation
  - Produces, processes, packages and delivers those isotopes not produced commercially
  - Re-establishing research and development of isotope production and the production of research isotopes
  - Pricing policy for research isotopes being developed; commercial isotopes are sold at full cost recovery
  - Serves a broad community of Federal agencies in addition to DOE—NIH, NIST, EPA, NNSA, DHS…

- **Operations for isotope production**
  - Stewardship of Brookhaven Linear Isotope Producer (BLIP) at BNL
  - Stewardship of Isotope Production Facility (IPF) at LANL
  - Isotope production at reactors at ORNL and INL
  - Hot cell facilities at BNL, ORNL, LANL, others
  - National Isotope Data Center (NIDC)--management information center for all national laboratories and universities in the subprograms portfolio of processing and production of isotopes

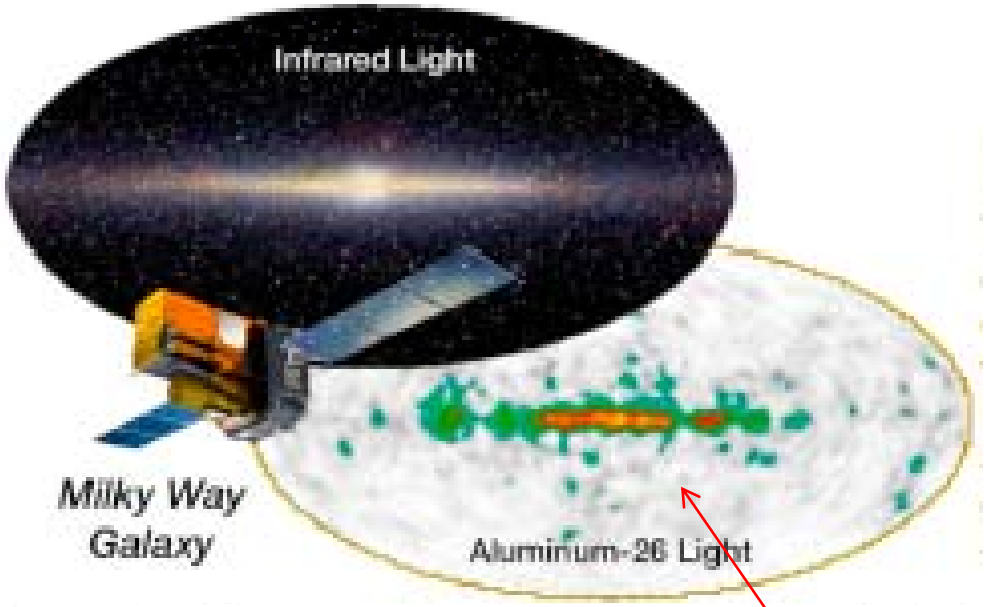
- **Responding to several reports, studies and workshops**
  - *Advancing Nuclear Medicine through Innovations,* NAS report identifying several areas warranting attention
  - *Workshop on The Nation's Needs for Isotopes: Present and Future,* NP sponsored workshop

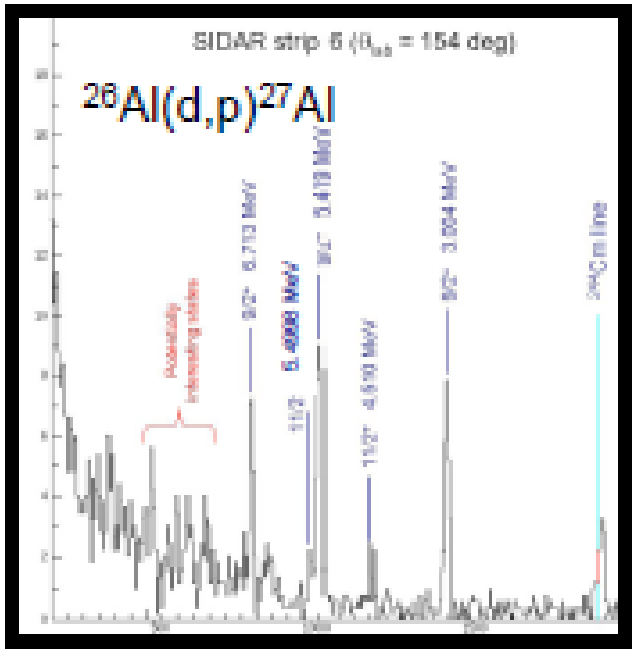


http://www.sc.doe.gov/np/

Selected Science highlights

Radioactive Beam Studies at HRIBF





NASA Cosmic Ray Observer on 10 year mission

Observations reveal light from one hundred trillion trillion kg of radioactive Al^{26} —— inconsistent with some models of how the chemical elements are created

Neutron capture studies in $^{26}Al(d,p)^{27}Al$ reactions

Key question: how fast does Al^{26} burn up in Stars ?