



RIB Task Force Update

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Outline

- Introduction and background
- Progress to date
- Issues for NSAC



Background

- In 2001, our field gave RIA highest priority for new construction.
- In 2003, the DOE Office of Science gave RIA very high ranking in its 20 Year Vision.
- In 2006, DOE announced that they would not proceed with the construction of RIA, but were interested in a lower-cost facility to be constructed early in the next decade



Priority Program Facility

Priority	Program	Facility
1	FES	ITER
2	ASCR	UltraScale Scientific Computing Capability
Tie for	HEP	Joint Dark Energy Mission
	BES	Linac Coherent Light Source
3	BER	Protein Production and Tags
	NP	Rare Isotope Accelerator
Tie for	BER	Characterization and Imaging
	NP	CEBAF Upgrade
7	ASCR	Esnet Upgrade
	ASCR	NERSC Upgrade
	BES	Transmission Electron Achromatic Microscope
12	HEP	BTeV
13	HEP	Linear Collider
Tie for	BER	Analysis and Modeling of Cellular Systems
	BES	SNS 2-4 MW Upgrade
14	BES	SNS Second Target Station
	BER	Whole Proteome Analysis
Tie for	NP/HEP	Double Beta Decay Underground Detector
	FES	Next-Step Spherical Torus
18	NP	RHIC II
	BES	National Synchrotron Light Source Upgrade
Tie for	HEP	Super Neutrino Beam
	BES	Advanced Light Source Upgrade
21	BES	Advanced Photon Source Upgrade
	NP	eRHIC
Tie for	FES	Fusion Energy Contingency
	BES	HFIR Second Cold Source and Guide Hall
23	FES	Integrated Beam Experiment

■ Near-term
■ Mid-term
■ Far-term

Programs:
 ASCR = Advanced Scientific Computing Research
 BES = Basic Energy Sciences
 BER = Biological and Environmental Research
 FES = Fusion Energy Sciences
 HEP = High Energy Physics
 NP = Nuclear Physics

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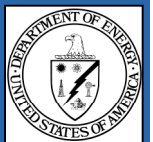
NSAC RIB Task Force Charge

This letter requests that the Department of Energy (DOE)/National Science Foundation (NSF) Nuclear Science Advisory Committee (NSAC) establish a task force to perform an evaluation of the scientific 'reach' and technical options for the development of a world-class facility in the United States for rare isotope beam studies within the funding envelope described below, and in the context of existing and planned research capabilities world-wide.

The results of this study should determine whether a forefront facility that will produce In context of the projected out-year budget for the Office of Science, funding is possible to start design and construction of a rare isotope beam facility that is up to half the cost of RIA (Actual Year Dollars) early in the next decade. For the Department to proceed on a schedule that initiates project engineering and design in FY 2011 and construction soon after, the scientific and technical capabilities for such a facility would need to be defined in FY 2007 proposals.

The results of this study should determine whether a forefront facility that will produce outstanding science in an international context within the suggested funding envelope can be defined, and if so, should identify the best option(s) for this facility. The report should contain sufficient details of the scientific capabilities and reach of the facility to inform the scientific community and NSAC in their development of the Long Range Plan, and sufficient technical detail so as to provide the guidelines to define such a facility in a request for proposals.

Please submit your final report to the DOE and the NSF by the end of March 2007. We realize that the development of this report during the period that NSAC is embarking on its long range planning exercise introduces an additional burden; however, it is believed that the information and guidance that emerges from this exercise on the requested timetable will be valuable to both the agencies and NSAC in its planning exercise.



Task Force Members

- Ewart Blackmore, TRIUMF
- Rick Casten, Yale
- David Dean, ORNL/UT
- Ed Hartouni, LLNL
- Claude Lyneis, LBNL
- Brad Meyer, Clemson
- Jerry Nolen, ANL
- Thomas Roser, BNL
- Brad Sherrill, MSU
- James Symons, LBNL, Chair
- Bob Tribble, Texas A&M, ex officio
- Sherry Yennello, Texas A&M



What we have done so far

- We met with the agencies and clarified the budget guidance and other matters.
- We held a three day meeting in Chicago during which, we:
 - heard detailed presentations from MSU and ANL describing ISF and AEBL, each of which is based on a 200MeV, 400kW HI Driver;
 - learned about upgrade plans of existing RIB Facilities;
 - learned of the challenges of using existing light ion drivers such as SNS.
 - were briefed by the Chairs of the RISAC study.
- Two hard-working subcommittees were formed
 - Cost Analysis, Thomas Roser, Chair
 - Scientific Reach, David Dean, Chair
- We met for two days in Berkeley to discuss recommendations.



What we have not done

- Rework the analysis of RISAC



Committee membership

- A committee with broad membership was sought in order to critically examine the scientific stakes
 - Experts both inside and outside of rare-isotope science were included
 - To balance the need for expertise and objectivity, known enthusiasts and known skeptics were also included
 - To help understand the global perspective, three international members were recruited
 - To ensure independence, committee co-chairs came from outside the immediate field but were broadly familiar with the science and policy of nuclear physics

<i>John Ahearne, Sigma Xi / Duke</i>	<i>Stuart Freedman, Berkeley</i>
<i>Ricardo Alarcon, Arizona State</i>	<i>Peter Braun-Munzinger, GSI</i>
<i>Adam Burrows, Arizona</i>	<i>Rick Casten, Yale</i>
<i>Gerry Garvey, Los Alamos</i>	<i>Wick Haxton, Washington</i>
<i>Robert Jaffe, MIT</i>	<i>Noemie Koller, Rutgers</i>
<i>Steve Libby, Livermore</i>	<i>Witold Nazarewicz, Tenn.</i>
<i>Michael Romalis, Princeton</i>	<i>Paul Schmor, TRIUMF</i>
<i>Shoji Nagamiya, J-PARC</i>	<i>Michael Wiescher, Notre Dame</i>
<i>Stan Woosley, Santa Cruz</i>	

What did RISAC say

“Nuclear science is entering a new era of discovery in understanding how nature works at the most basic level and in applying that knowledge in useful ways.”

“This report identifies a compelling scientific agenda for a future facility.”

“The committee believes that studies of nuclei and nuclear astrophysics constitute a vital component of the nuclear science portfolio in the U.S. Failure to pursue such a capability will not only lead to the forfeiture of U.S. leadership but will likely erode our current capability and curtail the training of future American nuclear scientists.”

“The committee concludes that a next generation, radioactive beam facility of the type embodied in the US FRIB concept represents a unique opportunity to explore the nature of nuclei under conditions that previously only existed in supernovae and to challenge our knowledge of nuclear structure by exploring new forms of nuclear matter.”



What did RISAC say?

- “As a partner among equals, a U.S. rare-isotope facility constructed in the next decade could be well matched to compete with the new initiatives in Asia and Europe and would support world-leading thrusts within the United States.”
- “Instead of arriving early on the science with a new facility, the United States might arrive last with FRIB, although the facility could have unique capabilities compared to other facilities available at that time.”



Technical Options for a World-Class facility

- the facility must address at least some of the outstanding scientific opportunities endorsed by RISAC;
- it must be complementary to other facilities, worldwide;
- it must have a compelling day-one science program.



FRIB

- Comparable reach to RIA, at half the cost
- Two questions come to mind:
 - How can this be?
 - Is there another factor of two to be found?



How can this be?

- Beam Power is an important parameter for isotope production
- Linac costs scale with energy
- » If we can decrease the energy of the driver but maintain the power, costs can be saved
- Success of the RIA R&D Program
 - Multi-charge state acceleration
 - Performance of VENUS Ion Source
- ANL (AEBL) and MSU (ISF) have developed designs for drivers with half the energy of RIA and twice the current



Comments on the cost review

- Two comprehensive, thorough, different estimates
- Both AEBL and ISF have demonstrated that a high intensity RIBF can be constructed at a much reduced cost relative to RIA
- If you take 60% out of the budget, something has to give:
 - Multi-user capability
 - Top energy (EOS Physics)
 - Trust fund for detectors
 - ‘Soft elements’ e.g. Pre-ops



Comments on Scientific 'Reach'

- Interesting Questions
 - How should we compare reach of different facilities?
 - How does reach vary with energy (and cost)?
- Teaser:
 - FRIB will be worth waiting for
 - Below 200MeV/nucleon, Heavy Ion Drivers lose 'reach' rapidly
 - Further significant cost-cutting will require a different technology or a different approach



What remains to be done

- Finish our Report
- Submit it to NSAC 'by the end of March'

- This will be done in time for discussion at the LRP Meeting in Galveston



So

- No details today, but . . .



In anticipation, the LRP Group may wish to

- Read the RISAC report; others will
- Think hard about timelines, budgets, and the history of the past 6 years
- “Insanity: doing the same thing over and over again and expecting different results.”
 - Albert Einstein
- We have to get it right this time

