DOE/SC-0085

Fusion Energy Sciences Advisory Committee

Report from the Committee of Visitors on its Review of the Processes and Procedures used to Manage the Theory and Computations Program

March 2004

U.S. Department of Energy
Office of Science

Executive Summary

A Committee of Visitors (COV) was formed to review the procedures used by the Office of Fusion Energy Sciences to manage its Theory and Computations program. The COV was pleased to conclude that the research portfolio supported by the OFES Theory and Computations Program was of very high quality. The Program supports research programs at universities, research industries, and national laboratories that are well regarded internationally and address questions of high relevance to the DOE. A major change in the management of the Theory and Computations program over the past few years has been the introduction of a system of comparative peer review to guide the OFES Theory Team in selecting proposals for funding. The COV was impressed with the success of OFES in its implementation of comparative peer review and with the quality of the reviewers chosen by the OFES Theory Team. The COV concluded that the competitive peer review process has improved steadily over the three years that it has been in effect and that it has improved both the fairness and accountability of the proposal review process. While the COV commends OFES in its implementation of comparative review, the COV offers the following recommendations in the hope that they will further improve the comparative peer review process:

- The OFES should improve the consistency of peer reviews. We recommend adoption of a "results-oriented" scoring system in their guidelines to referees (see Appendix II), a greater use of review panels, and a standard format for proposals.
- The OFES should further improve the procedures and documentation for proposal handling. We recommend that the "folders" documenting funding decisions contain all the input from all of the reviewers, that OFES document their rationale for funding decisions which are at variance with the recommendation of the peer reviewers, and that OFES provide a Summary Sheet within each folder.
- The OFES should better communicate the procedures used to determine funding levels. We recommend that the OFES communicate a clear and consistent policy on the level at which successful proposals are funded to both PI's and reviewers and document their rationale for the funding level of successful proposals.
- The OFES should add additional criterion when evaluating large university and laboratory theory groups with multiple investigators. We recommend that larger theory groups include an additional review criterion including clear evidence of collaborative work and the extent to which the group addresses problems requiring a team effort and that the threshold (currently 6 FTE's) for holding an on-site panel review of theory groups be reduced.
- The OFES should increase opportunities for new investigators (who have not previously received fusion theory and computations grants). We recommend that the OFES track the success rate for proposals by new investigators and that OFES consider ways that increase the success rate for proposals from new investigators.
- The OFES should encourage greater interaction between the theory and experimental programs. We recommend that experimentalists be invited to participate in the peer review process for theory grants and that reviewer evaluation criteria include efforts to validate theoretical models.

1. Introduction

In August of 2003 the Director of the Office of Science requested that the Fusion Energy Sciences Advisory Committee (FESAC) establish a Committee of Visitors review process for programs within the Office of Fusion Energy Sciences. Over the past few years the Office of Science has chartered Committees of Visitors to review elements of the Basic Energy Sciences program, and the reports of these previous committees (see http://www.sc.doe.gov/bes/besac/reports.html) were taken as models for the effort reported on here.

2. The Charge

The Charge to the COV was provided in a letter from Ray Orbach (Director of the Office of Science) to Richard Hazeltine (Chairman of FESAC). The charge letter requests that the committee review the management of the Theory and Computations program within the Office of Fusion Energy Sciences and assess the quality of the processes used to:

- Solicit, review, recommend and document proposal actions
- Establish the consistency between award decisions and the Office of Fusion Energy Sciences' programs and goals
- Monitor active projects and programs

The committee was also asked to comment on how the award process has affected:

- The breadth, quality and balance of portfolio elements
- The national and international standing of the portfolio elements

3. Committee Composition

The committee was chosen by Prof. Richard Hazeltine (FESAC Chairman) and Dr. W.M. Nevins (the COV Chairman) in consultation with OFES. They sought broad representation within the overall OFES magnetic fusion community, including members from universities, industry, and National Labs with both theoretical and experimental backgrounds. We also sought members from outside the OFES community with broad experience in plasma physics in an effort to benefit from their experience with peer review as it is practiced by funding agencies other than the DOE Office of Science. We settled on a COV with 15 members, including 8 from universities, two from industry, and 5 from National Laboratories. Ten members of the COV received the bulk of their

research funding from OFES, while of the remaining members four received all of their research funding from agencies other than OFES.

COV Panel Members

Name	Institution
Bill Nevins, Chair	LLNL
Mike Brown	Swathmore
Vincent Chan	GA
Dan D'Ippolito	Lodestar
Todd Ditmire	UT
Dan Dubin	UCSD
Alan Glasser	LANL
Martin Greenwald	MIT
Bill Kruer	LLNL
Mike Mauel	Columbia
Martha Redi	PPPL
Bob Rosner	Chicago
Carl Sovinec	U of Wisconsin
Ed Synakowski	PPPL
Richard Wolf	Rice

4. The Process

The COV met with the Dr. Anne Davies, Dr. John Willis, and the OFES Theory Team at the Department of Energy offices in Germantown on Nov. 13-14, 2003. The morning of Nov. 13 was devoted to presentations from the OFES staff. Dr. Davies (Head of the Office of Fusion Energy Sciences) reviewed the charge, and thanked the Committee for participating in this review. Dr. Willis (Director, Research Division) gave an overview of the comparative peer review process used by OFES for awarding grants. Dr. Steve Eckstrand (former Theory Team Leader, Research division) and Dr. Curt Bolton (Theory Team Leader, Research Division) provided summaries of the comparative review process as it was executed from Jan. through July ’01 as input to the award of SciDAC grants (the “SciDACReview”), from Jan. through Sept. ’02 as input to the award of FY ’03 Theory grants (the “FY ’03 Theory Review”), and from Jan. through Sept. ’03 as input to the award of FY ’04 Theory grants (the “FY ’04 Theory Review”). Finally, Dr. John Sauter gave a presentation describing how proposals made to the OFES are documented in “folders”.

The COV broke up into three subcommittees to review the folders documenting the FY ’03 Theory Review, the FY ’04 Theory Review, and the SciDAC Review. Breaking into three subcommittees was useful both to help distribute the work involved in reviewing the folders and (through care in designing the sub-committees) to assist

individual members in avoiding conflicts (no committee member reviewed a folder for a proposal led by their institution, or one in which they had had any financial involvement).

Sub-Committee	**Group 1**	**Group 2**	**Group 3**
Chair:	Todd Ditmire	Richard Wolf	Bob Rosner
	Bill Kruer	Mike Brown	Bill Nevins
	Dan Dubin	Vincent Chan	Carl Solvinec
	Alan Glasser	Martha Redi	Dan D'Ippolito
	Mike Mauel	M. Greenwald	Ed Synakowski
Assignment			
Nov. 13	SciDAC	'03 Theory	'04 Theory
Nov. 14	'04 Theory	SciDAC	'03 Theory

The COV met in closed session both on the (late) afternoon of Nov. 13 and (early) afternoon of Nov. 14 to discuss their findings. The meeting of the COV closed on the afternoon of Nov. 14 with a presentation of our preliminary findings by W.M. Nevins (Chairman of the COV) to the OFES Theory Team.

5. Discussion and Recommendations

During the past few years, OFES has put greater emphasis on the use of comparative peer review for the evaluation and award of theory grants. Our committee strongly endorses this use. In the broadest sense, the COV was extremely impressed with the quality of the review process implemented by the OFES Theory Team. This process has improved significantly over the last 3 years. The COV was particularly impressed with the new proposal review structure, which more closely approximates the NSF style of proposal competitions in which a significant number of new and renewal proposals are competed at the same time. This is a major improvement over previous methods of funding proposals based on consideration of a single proposal at any one time. This new process has led to an improvement in the quality of an already outstanding theory and simulation program.

Since 2001, the solicitation, review, and selection of proposals have followed a well-structured time-line. There is an annual call for proposals (usually in January), which includes broad guidance from the OFES on topics of programmatic interest (see, for example, http://www.science.doe.gov/grants/Fr03-18.html). Next, letters of intent (if applicable) and proposals are received. All proposals submitted in response to this call have the same deadline, and are considered together. The OFES Theory Team forwards those proposals judged responsive to the guidance provided with the call for proposals to (generally) three peer reviewers. ORISE assists the OFES Theory Team in tracking the progress of the peer review via PeerNet (a web-based system for accessing proposals and submitting reviews). Reports from reviewers come in (usually electronically through PeerNet) by about June. The Theory Team within the OFES reviews these reports and

makes a group decision on which proposals to recommend for funding. These funding recommendations are based both on the peer reviews and on overall considerations of program balance. Funding recommendations are forwarded to Dr. Willis (Director, Research Division) for final decisions. Dr. Willis may ask for additional reviews in an effort to give grant applicants as fair a hearing as possible. Theory and computations grants generally last for three years. Because there is a new call for proposals every year, unsuccessful applicants can (and often do) present a new proposal the following year.

Theory program funding is $27M per year —11% of the OFES budget. About 41% of the theory program funding goes to DoE labs, 41% to universities, 15% to industry, and 3% to non-DoE labs. Grant awards vary from small individual investigator grants with less than $100k annual funding to larger group and collaborative efforts employing many investigators with more than $1M annual funding. The entire theory sum is available every 3 years on a rotating basis.

Annual calls for proposals in theory and computations have appeared in each of the past three years. These calls have attracted 3 to 4 times more proposals than the OFES is able to fund. Almost all of these proposals were judged to be responsive to the guidance provided within the call for proposals and forwarded to peer reviewers. The peer reviewers provide both a written commentary on the proposal and a numerical score between 1 (Not Recommended) and 5 (Excellent). The bulk of the proposals sent out for review were well thought out and received scores between 3 (good) and 5 (excellent) from their peer reviewers. While funding of proposals has not been based solely the scores received from the peer reviewers (the OFES Theory Team exercises discretion in order to achieve program balance) almost all of the funded proposals received an average scores of 4 (Very Good) or greater from their peer reviewers.

The comparative peer review process is open to all interested principal investigators and is clearly more competitive than the mission-oriented process it replaced. The COV found that the comparative peer review process has improved steadily over the 3 years during which it has been in effect, and that it improves both the fairness and accountability of the process it replaced.

Quality of Peer Reviewers

The COV was impressed with the quality of the reviewers chosen by the OFES Theory Team. The list included many of the most able scientists within the OFES Theory program and their fields of expertise were generally very well matched to those proposals they were asked to review.

Consistency of Peer Reviews

In the comparative peer review systems used by the OFES Theory Team each reviewer will typically review and provide numerical scores (which range from 1 to 5) for about 3 (out of a total of about 40) proposals. Comparisons between proposals — which are critical to making funding decisions — require comparing the scores provided by one reviewer with those provided by others. However, comparing the written text to the numerical score, it appears that different reviewers use different criteria for assigning scores. In addition, different reviewers will often give markedly different scores to the same proposal. The COV found that the "cut-off" point for receiving funding was typically an average (between the reviewers) score of between 4.0 and 4.5. Individual proposals falling in this range often received scores of 3, 4, and 5 (occasionally 5, 5, and 2) from their three reviewers. That is, the variance between scores from individual reviewers often exceeds the difference between the average score for a proposal and the nominal score required to receive funding.

While the COV strongly endorses the use of peer-review, we have several recommendations on how it could be used more effectively.

A Result-Oriented Scoring System. Instead of associating an adjective to each numerical score [1–not recommended, 2–poor, 3–good, 4–very good, 5–excellent] the OFES Theory Team should associate a result to each numerical score [1–Do not fund (a single score of 1 will, very likely, eliminate a proposal's chances of funding), 2–Barely acceptable (a single score of 2 may eliminate a proposal's chances of funding), 3–Fund if budget permits (proposals with an average score of 3 should rank in the 3rd through 5th decile of all proposals submitted, and are typically not funded), 4–Deserves funding (proposals with an average score of 4 should rank in the second decile of all proposals submitted, but funding is not assured), 5–Must fund (Proposals with an average score of 5 should rank in the top 10% of all proposals submitted and will generally be funded.)].

Revised "Guidelines to Reviewers". A suggested revision to the "Guidelines to Reviewers" is attached as Appendix II.

Make Greater Use of Panel Reviews. The COV recommends a two-stage review process. The present system (written reviews by three anonymous peer reviewers) would form the first stage, to be followed by a second stage in which a review panel, formed from a subset of those providing written reviews, would meet together with the goal of providing the OFES Theory Team with an ordered list of proposals (that is a list containing all of the proposals ranked by technical quality). Given present experience (about 40 proposals in total to be scored) and reviewer work-load (about 3 reviews/reviewer) it would require a panel of between 10 and 15 reviewers to insure that each proposal had been reviewed by at least one panel member. Based on previous OFES experience (the SciDAC reviews and Innovative Confinement Concept panel reviews) it should be possible for each member of such a panel to provide the OFES Theory Team with an "ordered list" of the proposals after a meeting which lasted 3 to 4

days. While the ordered lists from each panel member may not be identical, their experience in interacting together should greatly reduce the variance between lists. The direct cost of such a panel (travel for, perhaps, 5 persons — the travel for most of the panel members would be charged to their existing theory grants) would be modest (probably less than $25k), while the actual cost (including salaries and travel for all pane members) would be somewhat higher (perhaps as much as $100k). This should reduce the variance among reviewer's scores, and be well worth the additional cost.

A Standard Format for Proposals to enforce some uniformity so that reviewers (and auditors like this COV) could more easily make comparisons. The COV suggests the following:

a) Executive Summary — one page summarizing all pertinent points below
b) Abstract — one paragraph summary of the planned work
c) Background — putting the proposed work into scientific and programmatic context
d) Description of recent accomplishments — for renewals
e) Proposed research — including scope, schedules, deliverables
f) Textual summary of budget (in addition to the formal budget pages)
g) Management plan — if appropriate (for larger groups)
h) Description of facilities, resources, and personnel
i) Other current and pending support

Procedures and Documentation

The COV approves of the procedures used by the OFES Theory Team for soliciting and reviewing proposals. The manner in which each proposal was considered for funding is documented by an individual "folder" containing the proposal, written reviews from each of its peer reviewers and, in the event that it is selected for funding, a record of the size and duration of the grant which was received.

These procedures were followed in almost all of the "folders' reviewed by the COV — demonstrating that the OFES Theory Team has implemented the comparative peer review system in an ordered and disciplined manner. We note that these folders were prepared before they had any reason to anticipate that they would be reviewed by a COV. This involved a substantial effort in retaining and archiving documents relating to each proposal received. We commend the OFES on this effort. However, the COV makes the following recommendations to improve the documentation:

- **Ensure that the "folders" contain all the input from all of the reviewers.** A small number of folders did not contain reviews from (at least) three referees or, very occasionally, did not contain the reviews (and scores) from all of the peer reviewers who had been assigned to review that proposal. This situation often appeared to have been a consequence of difficulty in getting referees to respond in

a timely manner or because some peer reviewers failed to use the web-based PEERNET system to submit their review. The COV believes it important that complete reports from all the reviewers be retained in the folders to properly document each funding decision.

- **Document rationale for funding decisions which are at variance with the recommendation of the peer reviewers.** Some funding decisions seem to be at variance with the contents of the folders. The COV appreciates that this situation results from the Theory Team using other criterion (such as "programmatic balance") in making its funding recommendations, and recognizes the necessity of the Theory Team very occasionally overriding the peer reviews — in fact, the COV often found themselves in agreement with the actions taken by the Theory Team in this regard. However, we think it important that the Theory Team include a brief memo in the relevant folder documenting the "other considerations" which led to the funding decision and describes the Theory Teams rationale for the decision they reached in those cases where they have chosen to over ride the advice from the peer reviewers.

- **Provide a Summary Sheet within each folder.** In the interest of assisting future COV's, we recommend that each folder be expanded to include a summary sheet which provides the following information:

    1. The institution applying for the funding
    2. The principal investigator
    3. The title of the proposal
    4. Whether this is a renewal or a proposal for new funding
    5. A list of the peer reviewers and their scores
    6. The disposition (funded, close-out funding, or not funded)
    7. Funding level (both the PI's request and the OFES funding reward)

The COV appreciates that all of this information is already available somewhere within the folder, but feels that job of future COV's would be greatly facilitated by collecting it on a single summary sheet for each proposal.

Decisions on the Level of Funding

The COV found that successful proposals — even proposals receiving "excellent" scores from each of the peer reviewers — often (perhaps always?) received substantially less funding than that requested by the PI. Given these large disparities between the PI's request and the actual funding grant, it becomes important to document the procedures used to determine the recommended funding levels.

- **The Theory Team should have a clear and consistent policy on the level at which successful proposals are funded** which can be communicated to both potential PI's and to peer reviewers. The PI's need to understand the Theory

Teams policy on funding successful proposals so that they don't define a scope-of-work that is more ambitious than the OFES Theory Team is willing to consider. The reviewers need to understand the policy so that they can intelligently comment on the proposed budget.

- **Document rationale for funding levels.** A description of the rationale for the particular funding level recommended by the Theory Team should be included in the folder for each successful proposal.

Large University and Laboratory Theory Groups

The COV found that some of the proposals considered (and funded) under the general call for proposals encompassed larger scale efforts involving multiple investigators. These proposals usually included three or more FTEs and had substantially higher annual budgets (few hundred k$) than the single investigator proposals. These proposals competed against the smaller scale single investigator proposals. The COV felt that some of these large-scale efforts were of a significant enough difference in scale and budget to warrant with the inclusion of additional criterion when considering them for funding. These additional criteria for larger group proposals would be an addition to those criteria used in judging single investigator grants. In particular, these larger group proposals should be rated on the synergy of the group. This will prevent block grant funding of a collection of unrelated single investigator style efforts. With respect to synergy, appropriate review criteria are

- Clear evidence of collaborative work
- The extent to which the group addresses problems requiring a team effort

The OFES Theory Team should also reduce the threshold (currently 6 FTE's) for holding an on-site panel review. Alternatively, they could hold a "reverse" site review, in which representatives of several institutions traveled to a common site to make presentations to a common review panel.

Program Evaluation

The OFES Theory Team evaluates program execution by having team members attend technical conferences and workshops regularly to learn about theory progress and discuss issues with project/program staff; through annual progress reports from PI's who have received theory grants; and through presentations at the annual budget planning meeting. The Theory Team takes this information into account when making funding decisions

The COV believes that the many interactions between the OFES Theory Team and members of the theory community are, in part, responsible for the markedly higher probability that proposals for renewed funding will be successful relative to that for new proposals (particularly new proposals from principal investigators with no previous funding history from the OFES). The COV recognizes that program execution and program continuity are important and we found ourselves in agreement with the individual decisions made by the Theory Team.

However, we were struck by the success rate for proposals for renewed funding (greater than 90%) vs. the success rate for proposals submitted by individuals who had not previously received OFES theory and computations funding (less than 10%). The COV believes it is in the best interest of the fusion energy science program that opportunities be found that encourage and enable funding of quality proposals from new investigators who have not previously received OFES funding. This issue is related to those of demographics and diversity discussed in the next section. The COV recommends

- **That the Theory and Computations team track the success rate for proposals by new investigators** trying to enter the OFES Theory program, and present this information to future COV's.

- **That the OFES seek opportunities to fund new proposals from investigators with no previous funding history from the OFES.** The present success rate for such proposals is about one per cycle. It is the opinion of the COV that the quality of the proposals from prospective new entrants into the OFES Theory community easily justifies a doubling of their success rate.

Demographics and Diversity

The OFES Theory and Computations community is mainly composed of white and Asian males over 50 years of age. The composition of the community reflects the absence of any funding increases over the last two decades in this field and largely reflects the "hiring pool" of 20 years ago. Yet the composition with respect to gender of the plasma physics community is in fact different from the US physics community; for example, the fraction of members of the American Physical Society overall who are female (9%) is twice that of the American Physical Society Division of Plasma Physics (5%). The fraction of US physics PhD's earned by women is now at 13%, up from 6% earned by women 20 years ago. The fraction of women professors of physics at the top 20 universities in the US is 6%; the fraction of women professors of plasma physics in MFE is <1%. Support for young faculty in plasma science is critical for the long-term health of the field and special attention is needed in reviews and decisions on young faculty grant proposals. The equitable distribution of research funding according to merit, without discrimination according to age, gender or race is an important goal for DOE and other government agencies. Clearly, research-funding decisions can critically affect the demographic balance of US science and engineering programs. The annual OFES proposal process is the gateway into the program, so it is important to understand how it

can be used to effectively recruit young physicists in general, and women and minority physicists in particular.

The COV discussed this issue among ourselves and with the OFES management. It is our opinion that the OFES management views enhancing the diversity of the OFES program generally as an important goal, and is working to achieve it. Because of the lack of diversity in our program we encourage OFES in the future to request voluntary information about gender and ethnicity, etc. from principal investigators, just as NSF and other government funding agencies do. In Appendix III we reprint a section from the most recent NSF Grant Proposal Guide, NSF 04, which may be found at http://www.nsf.gov/pubsys/ods/getpub.cfm?gpg. This addition to the information requested in submitting a grant proposal to DOE would not be inconsistent with existing government rules and would provide some data on the funding demographics. We applaud the efforts of the OFES management to increase diversity of the scientific community they fund, and wish them additional success in formulating strategies to achieve this end.

Encouraging Greater Connection Between the Theory and Experimental Programs

As currently implemented, there are parallel peer review processes for theory and experimental grants. The COV recognizes that such a division is necessary to the management of the peer review process. However, one undesirable consequence of this division is a tendency for proposals aimed at validating theory against experiment to plummet into the gap between these parallel review processes. A continuing dialogue between the theory and experimental programs of the OFES is greatly to be desired, and both the theory and experimental grant review processes should encourage this dialogue. To this end, the COV recommends:

- **Inclusion of experimentalists in the peer review process** for theory grants.
- **Consideration of proposed efforts to validate of theoretical models as part of the reviewer evaluation criteria** (see Appendix II).

Program Quality

The COV did not solicit input on the program quality. However, as researchers active in the field of plasma physics it is our opinion that the OFES supports a high-quality theory program. This view is supported by a recent review of Plasma Science by the National Academy of Science [see *Plasma Science: From Fundamental Research to Technological Applications*, The National Academies Press (1995), available on-line at http://www.nap.edu/books/0309052319/html/].

The plasma theory effort supported by OFES is well regarded internationally. Evidence of this regard can be seen in the preponderance of talks by US theorists at major international meetings. For example, at the 19th Fusion Energy Conference (IAEA-CN-94, 14-19 Oct. 2002, Lyon France. The program of this conference is available on-line at http://www-pub.iaea.org/MTCD/publications/PDF/csp_019c/START.HTM) scientists supported by OFES theory grants were chosen to present four (out of a total of twelve) of the theory talks; while two additional talks include scientists supported by OFES Theory grants as co-authors. This was more than any other national group (European scientists collectively presented 3 theory talks).

Appendix I . The Charge Letter

Professor Richard D. Hazeltine, Chair August 15, 2003
Fusion Energy Sciences Advisory Committee
The University of Texas at Austin
Institute for Fusion Studies
1 University Station, C 1500
Austin TX 78712-0262

Dear Professor Hazeltine:

This letter provides a charge to establish a Committee of Visitors (COV) through which the Fusion Energy Science Advisory Committee can assess matters pertaining to program decisions on a regular basis. It is our desire to have the COVs review program management every three to four years, on a rotating basis, for the following elements of the Fusion Energy Sciences program:

- Theory and computation
- Confinement innovation and basic plasma science
- Tokamak research and enabling technologies

Specifically, the committee is asked to assess, for both the National Laboratory, University and private industrial participants, the efficiency and quality of the processes used to:

- Solicit, review, recommend and document proposal actions
- Establish the consistency between award decisions and the Office of Fusion Energy Sciences' programs and goals
- Monitor active projects and programs

The committee is asked to comment on how the award process has affected:

- The breadth, quality and balance of portfolio elements
- The national and international standing of the portfolio elements

The first area that I would like you to address is the theory and computation program. You should work with the Associate Director for the Office of Fusion Energy Sciences to establish the processes and procedures for the first COV.

I believe that the COV will help us maintain a high standard of scientific research. I look forward to your feedback on how the Office of Fusion Energy Sciences is making program decisions, and how that decision process can be improved.

I would like to have a final report from you by the summer of 2004.

Orbach

Appendix II. Revised Evaluation Criteria and Scoring

1. Scientific and technical merit of the proposed research.
   a. Does this application address an important problem in plasma science, plasma technology, fusion energy sciences, or fusion energy technology?
   b. How does the proposed research compare with other research in its field, both in terms of scientific and/or technical merit and originality?
   c. What is the likelihood that it will lead to new or fundamental advances in its field?
2. Appropriateness of the proposed method or approach.
   a. Are the conceptual framework, methods, and analyses adequately developed and likely to lead to scientifically valid conclusions?
   b. Does the proposed research employ innovative concepts or methods?
   c. Does the applicant recognize potential problems and consider alternative strategies?
3. Competency of applicant's personnel and adequacy of proposed resources.
   a. How well qualified are the applicant's personnel to carry out the proposed research? (If appropriate, please comment on the scientific reputation and quality of recent research by the principal investigators and other key personnel.)
   b. Please comment on the applicant research environment and resources.
   c. Does the proposed work take advantage of unique facilities and capabilities and/or make good use of the collaborative arrangements?
4. Reasonableness and appropriateness of the proposed budget.
   Are the proposed budget and staffing levels adequate to carry out the proposed research? (Note: the OFES Theory Team often funds projects at less than the requested level)
5. Other appropriate factors.
   How is the proposed project relevant to the Office of Fusion Energy Science's goals?
   Does this proposal include efforts to validate theoretical models against experiment?
6. Other constructive comments for the Principal Investigator.
   What are the overall strengths and weaknesses of the proposal?
7. Please rate the proposal based on the following scale (fractional scores are acceptable):
   1 – Do not fund (a single score of 1 will, very likely, eliminate a proposal's chances of funding)
   2 – Barely acceptable (a single score of 2 may eliminate a proposal's chances of funding. Proposals with an average score of 2 or less should rank in the bottom 50% of all proposals submitted)
   3 – Fund if budget permits (proposals with an average score of 3 should rank in the 3rd through 5th decile of all proposals submitted, and are typically not funded)
   4 – Deserves funding (proposals with an average score of 4 should rank in the second decile of all proposals submitted, but funding is not assured).
   5 – Must fund (Proposals with an average score of 5 should rank in the top 10% of all proposals submitted and will generally be funded.)

Appendix III. NSF Request for Information on Principal Investigators

The following is quoted from the NSF Grant Proposal Guide, Section II.C.1.a, page 13. http://www.nsf.gov/pubsys/ods/getpub.cfm?gpg in the hope that it may serve as a model for a similar request for information about the gender, race, ethnicity and disability status of individuals named as PIs/co-PIs on proposals and awards from the Office of Fusion Energy Sciences.

C. PROPOSAL CONTENTS

1. Single-Copy Documents

Certain categories of information that are submitted in conjunction with a proposal are for "NSF Use Only." As such, the information is not provided to reviewers for use in the review of the proposal. With the exception of proposal certifications (which are submitted via the Authorized Organizational Representative function), these documents should be submitted electronically via the Proposal Preparation module in the FastLane system. A summary of each of these categories follows:

a. Information About Principal Investigators/Project Directors and co-Principal Investigators/co-Project Directors

NSF is committed to providing equal opportunities for participation in its programs and promoting the full use of the Nation's research and engineering resources. To aid in meeting these objectives, NSF requests information on the gender, race, ethnicity and disability status of individuals named as PIs/co-PIs on proposals and awards. Except for the required information about current or previous Federal research support and the name(s) of the PI/co-PI, submission of the information is voluntary, and individuals who do not wish to provide the personal information should check the box provided for that purpose.