

Response to Issues Raised in the Report of the 2003 Division of Physics Committee of Visitors

(Original Response, March 2003 with Updates in January and in November 2005)

INTRODUCTION

This document responds to the Report of the 2003 Committee of Visitors (COV) for the Division of Physics (PHY), which met on 26-28 February 2003 and submitted their report to the Chair of the Advisory Committee for the Directorate for Mathematical and Physical Sciences (MPSAC) on 17 March 2003. This response was drafted by the Division of Physics and then edited by me to provide an MPS, rather than simply a Division, perspective.

I am pleased that the COV gave the Division high marks for performance, based on its in depth examination all aspects of the operation of the division, including review procedures, decisions and decision process, portfolio balance, quality of outcomes, strategic vision, priorities, etc. However, the COV also identified and commented on a range of issues for consideration by MPSAC, MPS, and PHY in the interest of further improving the performance of the division. The present response focuses on those issues, provides some initial feedback, and indicates what actions are planned to address each issue.

ISSUE 1: Use of Criterion 2

The COV found that there had been clear improvement in the use of Criterion 2 in the proposal and review processes, although it had not yet become fully ingrained in the culture of the PHY community. Panel reviewers addressed broader impacts better than proposal writers and ad hoc reviewers as a result of direct encouragement by program directors; and program directors consistently addressed Criterion 2 in their review analysis and decision process. Requirements built into FastLane that proposal writers address Criterion 2 in the proposal summary and that a reviewer place something in a box devoted to Criterion 2 were found to help, and PHY does include emphasis on Criterion 2 in its annual notification of the target dates. But the COV recommended that PHY take stronger action to improve the community's understanding of the value and nature of Criterion 2. Further, the AMOP COV subpanel emphasized the need to "quantify the impact of the program more systematically. In particular, data about intellectual property (e.g., patents, licensing agreements, invention disclosures, etc.) should be made available by PIs and Centers in their annual reports."

Action: PHY will post on the PHY web site a "Dear Colleague" letter discussing the meaning and importance of Criterion 2. This letter will contain examples of different types of broader impacts. It will emphasize that greater appreciation of broader impacts will add value to and strengthen public support for basic research and that this will not detract in any way from the importance of intellectual merit in evaluating proposals. This letter will also be offered for publication in APS News, the monthly newsletter sent to all members of the American Physical Society, and it will be sent electronically to members of all divisions of the APS, and all PIs and reviewers. Regarding the need to document societal impact of work supported by PHY, we will

encourage grantees to address this in their annual reports and highlights in a more systematic way.

PHY Response as of January 1, 2005: PHY inserted a pointer to the NSF website “Merit Review Broader Impacts Criterion: Representative Activities”, (<http://www.nsf.gov/pubs/2002/nsf022/bicexamples.pdf>), into the PHY Dear Colleague Letters (<http://www.nsf.gov/pubs/2004/nsf04041/nsf04041.htm>) announcing the Target Dates for proposal submission for FY 2004 (NSF 03-146) and for FY 2005 and FY 2006 (NSF 04-041), respectively. This website offers examples of activities addressing the integration of research and education; broadening participation of underrepresented groups; enhancing the infrastructure for research and education; broad dissemination to enhance scientific and technological understanding; and benefits to society. In addition, an internal PHY working group is developing a description of examples specific to the physics research environment that can be posted prior to the next major round of proposals to PHY in late September 2005 (for FY 2006).

PHY Response as of November 1, 2005: PHY continued to point to the NSF website “Merit Review Broader Impacts Criterion: Representative Activities”, in its Dear Colleague Letter (NSF 05-036) announcing the target date for proposal submission for FY 2006 funding. A description of examples specific to the physics research environment is still under development.

ISSUE 2: Physics Frontiers Centers

The COV gave the Physics Frontiers Centers Program high marks as a new part of the PHY portfolio, but also made three specific comments/recommendations. They stressed the need for PFCs to clearly demonstrate two attributes in order to justify the level of investment. They need to demonstrate synergy or value added, relative to the equivalent amount of individual PI support; and they need to demonstrate that they are attempting important activities with a higher risk than that typically borne by the individual PI. The second recommendation is to review the performance of the existing PFCs against these criteria before the next competition, which will begin in August 2005. The third recommendation is for PHY to communicate more with the community regarding the PFC program to improve the general understanding of this new activity.

Response and Action: MPS concurs that synergy and added value are important considerations in evaluating PFC candidates, and also in evaluating PFC performance. In fact, synergy or value added is already an explicit criterion for the evaluation of proposals. Risk is emphasized indirectly by stating in the program announcement that PFCs are “supported to enable research at the frontiers of physics of a scope and complexity that would not be feasible with standard individual investigator or small group support.” In future competitions we will explicitly state that reviewers will consider whether the proposed research is of a scope and complexity beyond what could be undertaken by individual investigators or small groups.

Unfortunately it is not practical to review the existing PFCs before the next competition in order to evaluate their effectiveness. Two of the new PFCs will begin operation only in mid-FY 2003, and the next competition will begin in mid FY-2005, so the track record of some of the newer ones will be very short. Further, the effort involved in a separate review of all of the PFCs

would be substantial for both PFC and NSF staff. Instead, the overall effectiveness of the PFCs and the performance of individual centers will be evaluated in the following way: All PFCs are scheduled to be reviewed by a site visit with an external panel after three years, in order to determine if they should be encouraged to re compete during the next cycle or if they should be notified that they will be phased out. In addition, all renewals are made only as a result of an open competition with all other proposals for new and renewed PFCs. Each of these reviews will look for evidence of synergy, value added, and scope and complexity beyond that expected from equivalent support of individual PIs. In addition, the effectiveness of the PFC program as a whole will be a special focus of the 2006 COV, with that COV constituted to have the breadth and perspective to address this important and complex issue. Finally, PHY will communicate more effectively with the community regarding the PFC Program, including a “Dear Colleague” letter on the web, visits to or communication with the divisions of the APS, and other venues.

PHY Response as of January 1, 2005: Since the 2003 COV, PHY has established two new PFCs, one at Notre Dame and the other at the University of Wisconsin. In addition, we have transferred three existing centers from other programs into the PFC program, bringing the total to 10 PFCs in FY 2005. A comprehensive plan has been developed to provide for competitions among the existing centers and for new centers as funds permit. The next competition will be in FY 2006 among five of the existing PFCs. There will not be an invitation for new centers in the FY 06 competition. Each of the PFCs is reviewed intensively in its third year of funding to assess progress. Some of the PFCs will have to be given extensions, after a review, to bring their funding cycles in line with the schedule of competitions. The PFC program officer talks about the PFCs in her presentations before DAMOP (a division of the American Physical Society) and to NRC meetings. In addition the Division Director talks about the PFC program in all overview talks, e.g., at advisory committee meetings, NRC panels, workshops, general APS meetings, etc.

PHY Response as of November 1, 2005: The FY 2006 competition among five of the existing PFCs is underway. There is no invitation for new centers in the FY 06 competition. Some of the PFCs will be given extensions, after a review, to bring their funding cycles in line with the schedule of competitions. The PFC program officer talks about the PFCs in her presentations before DAMOP and to NRC meetings. The Division Director talks about the PFC program in overview talks, e.g., at advisory committee meetings, NRC panels, workshops, general APS meetings, etc.

ISSUE 3: Diversity

The strategic goal of increasing diversity in the science community received much attention by the COV. Progress was noted, including new PIs from underrepresented groups, a PFC at Hampton University, new activities at an Hispanic serving university, policy of revisiting/reversing borderline declines from underrepresented PIs (new procedure instituted after discussions with the 2000 COV), etc. However, the COV drew attention to the poor net progress, and called for establishment of goals and assessment as a means to improve long-term progress.

Response and Action: MPS concurs that the progress of the Physics in improving diversity in its awards portfolio has been poor, as shown by statistics for the period FY 1999 to FY 2002,

over which the number of women PIs and minority PIs are approximately flat at averages of 54 and 27, respectively, out of an average total of 627. To address this, PHY is setting the goal of increasing the numbers of female PIs by at least two and the number of minority PIs by one each year over the next 10 years, thus increasing both categories by 37%. The division will reserve \$300K each year to invest toward the goal of making 2+1 new awards. Further, in order to document progress in increasing diversity, PHY will begin in FY 2003 to track new PIs, continuing PIs, postdocs, graduate students, undergraduate students, and K-12 teachers and students from underrepresented groups either supported or impacted by PHY support. This is not straightforward, because providing gender or racial data is voluntary; however, a plan will be made to acquire reliable data to track progress.

PHY Response as of January 1, 2005: PHY progress in this area has been slow and ambiguous. A brief comparison of 3-year averages for the periods 1997 – 1999 and 2002 – 2004 show the following:

3-Year Averages	# Awards Comp+CGIs	# Awards Female	Percent Female	# Awards Minority	Percent Minority
1997 - 99	590	55	9.3	25	4.2
2002 - 04	668	59	8.8	33	5.0

The focus on this challenge runs through all of the activities of the division, awards/declines, review panels, staff appointments, advisory bodies, etc. The Division Director must concur on all actions. In addition, for declinations of underrepresented individuals, each case is reexamined for possible reversal of the decision. Each such re-review is noted. Each year, one or two awards are made to underrepresented individuals near the borderline, although these frequently do not get to the point of declination and re-review. In FY 2005, a separate budget element, currently called “broadening participation” is in the PHY budget structure. The level of funding for FY 2005 is 450K.

PHY Response as of November 1, 2005: The practices outlined above are continuing. Some updated figures on numbers of research awards to women and to minority PIs are given below.

	PHY Research Grants				
	All PIs	Female PIs		Minority PIs	
FY	# Awards Comp+CGI	# Awards Comp+CGI	% of RGs	# Awards Comp+CGI	% of RGs
2005	566	53	9.4%	26	4.6%
2004	550	45	8.2%	28	5.1%
2003	580	48	8.3%	31	5.3%
2002	525	37	7.0%	22	4.2%
2001	539	33	6.1%	22	4.1%
2000	515	43	8.3%	22	4.3%
1999	491	48	9.8%	26	5.3%
1998	483	42	8.7%	22	4.6%
1997	492	35	7.1%	20	4.1%
1996	463	28	6.0%	21	4.5%

ISSUE 4: CAREER Program and Young Investigators

Both the 2000 and 2003 PHY COVs focused on the CAREER program itself, how CAREER proposals have been handled by PHY, and the impacts of both on the careers of young investigators. Several concerns were expressed about the design of the CAREER program itself. First, the 50% weight given to educational activities was regarded as too high for beginning faculty. Second, the emphasis on novel educational activities was considered inappropriate to someone just beginning their academic career. Allowance for employing proven strategies should be included as an acceptable option. Several reasons were given for this, and specific changes in the program announcement were suggested in the COV report. Third, the rigid minimum award amounts were detrimental to young investigators applying to programs with average grant size up to a factor of two lower than the minimum award. Fourth, it is not permitted to make a regular award to a PI whose CAREER proposal is declined, even if the review panel believes that this is appropriate. The existing practice in PHY is to review the CAREER awards in the program panels along with the other proposals submitted to the program. These panels do not occur until several months after the CAREER deadline, so that there is not an opportunity for unsuccessful CAREER proposals to be followed by regular proposals the same year, resulting in a serious setback for the most promising young investigators. Additionally, the proposal processing time is thereby made much longer than the NSF goal of 6 months. Finally, the high priority and enhanced awards involved with the CAREER program has led to universities considering a CAREER award a national prize, thus increasing the importance of success in this competition to the young investigators tenure case, rather than putting emphasis to educational activities. All things considered, the COV expressed deep concern about the efficacy of the CAREER program.

Response and Action: The concerns of the COV will be transmitted to the NSF working group for CAREER. CAREER is an NSF-wide program with rules that were adopted after very careful consideration revised somewhat after the first few years. Further, CAREER is considered a very successful program for several other disciplines within MPS, where panels believe that bright young investigators should be given a fast start, even if this means providing larger grants than most senior investigators. The Assistant Director agrees that failure of some of the brightest

young investigators to secure funding from the NSF at a critical time in their career is an unacceptable outcome. As a partial solution to the problem, PHY will hold a special CAREER panel as soon as possible after the deadline, so that decisions can be made in time for unsuccessful candidates to submit their projects as regular proposals in the same fiscal year. This approach will hopefully encourage panels to focus on the two NSF review criteria, rather than the CAREER award size, in setting priorities among the proposals.

PHY Response as of January 1, 2005: Following the 2003 COV meeting, PHY held extensive internal discussions on the handling of CAREER proposals and on the concern that young PIs were possibly being excluded from regular competitions because of CAREER guidelines. CAREER proposals are submitted in July and the PHY target date for most programs is in late September each year. For the FY 2004 and the FY 2005 CAREER competitions, PHY assembled a single panel to review the applications on a fast track so that the PIs could be informed of the results in time to submit a regular research proposal if necessary. PHY also agreed that proposals from unsuccessful CAREER applicants would be allowed to come in farther beyond the late September target date than is usually encouraged, and still be considered in the regular review cycle. The panels for the FY 2004 and FY 2005 competitions were held in September 2003 and October 2004, respectively. Mail reviews were obtained prior to the panel meetings. In both years, PHY found that the panel timetable put severe pressure on the review process and that the panel itself was difficult to compose for reviewing proposals over such a wide range of research topics. Thus, after two years of experimenting with accelerated review of CAREER proposals, PHY has concluded that it will use *ad hoc* mail reviews for CAREER proposals in the future with the intent of providing results to PIs in time for them to submit to the regular PHY competition, if desired.

PHY Response as of November 1, 2005: PHY used ad hoc mail review on the 75+ CAREER proposals received for the FY 2006 competition. PHY program officers are meeting to develop the slate of CAREER awards for this year. Unsuccessful proposers are being informed so that they can decide whether to submit proposals to the regular PHY competitions. Proposals from these PIs will be accepted beyond the target date, provided they arrive in time to participate in the programs' review cycles.

ISSUE 5: Future COV Procedures

The COV made six suggestions for improving the efficiency and efficacy of the COV process. The following set of bullets is taken directly from the COV report (pp 7-8):

- We needed more time for the discussion of Division level issues.
- We needed more time for reading jackets and felt that less time could have been spent on the presentations the first day.
- The teleconference the week in advance of our meeting was very helpful and future COVs might consider emulating that.
- We would have appreciated copies of some of the national planning documents (e.g. Quarks to the Cosmos) available.
- We would have appreciated some 10-year trend statistics, ideally in advance of the meeting. Some obvious examples are funding trends, ratios of award to request by program, fraction of proposals from underrepresented minorities, etc.

- Finally we felt that the process might have more continuity if there was a bit more overlap with previous COVs and in particular if the chair of the COV had participated in a previous panel.

Action: These are excellent suggestions, which **PHY** plans to implement before the 2006 COV.

PHY Response as of January 1, 2005: PHY will implement these suggestions as we plan for the next COV in January 2006.

PHY Response as of November 1, 2005: PHY began planning for the 2006 COV in July. We have a chair and a few members who participated in the 2003 COV. The agenda is being developed to allow more time for reading jackets and for discussion of Division level issues. The background information being prepared will include data on 10-year trends on funding, balance, involvement of underrepresented groups, and other issues.

ISSUE 6: Impact of Facilities on Portfolio Balance

The COV expressed deep concern about the impact of operating expenses for facilities on the portfolio, in particular on the support for individual PIs. This was acute in FY 2002, when LIGO completed commissioning activities and began full operations and when the upgraded nuclear physics facility at the National Superconducting Cyclotron Laboratory began operations. Funding the operating needs of these new or upgraded facilities caused a large cut in the core disciplinary programs that fund individual PIs. The COV stressed the importance of avoiding such impacts in the future, as LHC and RSVP operations start. Quoting from the COV report: “We felt that there needs to be an agency wide plan to support the operations of these large facilities.” Further, “We note that construction funding for LHC-related projects ceases in FY 2003. We wish therefore to call attention to the need for operations funding beyond 2003 if the EPP Program is to reap the benefit of its (MREFC) considerable investment in the LHC. Operations funding is a Foundation-wide issue that looms large for several projects and must be addressed.”

Response: The planning for and funding of operations of facilities is under active discussion, as the NSF enhances its procedures for the planning, management, and operation of large facilities. The current policy for the Major Research Equipment and Facilities Construction (MREFC) account states that the requesting directorate is responsible for providing operating funds for facilities constructed by the MREFC account. This policy has the purpose to encourage more careful planning. It is expected that in cases in which the added expenses of new facility operation cannot be met through overall budget increases, the needed funds will come from reduction in funding of lower priority activities. Estimates of operating costs are made at the time of the MREFC request, to provide time for planning to cover these expenses, e.g., through the phasing out of older facilities. PHY has closed one mature facility and has scheduled the phase out of another in order to evolve with the changing needs of frontier research; however, this process has not kept up with the needs for advanced facilities over the last 10 years.

The very substantial increase in the PHY FY03 budget will help to alleviate the pressure on the core disciplinary programs. It should be noted, however, that despite the effects of facilities

operations on the core programs, PHY has maintained the highest success rates for competitive proposals of any MPS division. For the period FY2000-2002 PHY funded over 45% of proposals reviewed, significantly higher than any other MPS division.

PHY Response as of January 1, 2005: In the time since the 2003 COV there has been substantial progress in identifying operating funds for new facilities during the budget process. Improved operating profiles have been established for the LHC and for NSCL through cooperation between PHY and the OAD/MPS. This has been done while keeping the balance between facilities + centers and the core programs at about 50:50. PHY has become more alert to the need to scrutinize estimates of future operations costs during the planning stages leading up to a decision on the start of construction. These estimates will be subject to rigorous review and scrutiny along with the technical requirements and cost estimates for the construction itself.

PHY Response as of November 1, 2005: PHY intends to continue holding the balance between (facilities + center-like activities) and core individual investigator – like activities at about 50:50. In FY 2005 this led to an acceleration of the schedule for phase out of one mature facility. Increased scrutiny of the potential future operating costs for RSVP was a major factor in NSF's decision in August 2005 to terminate that project before start of construction.

ISSUE 7: PHY Staffing

The COV noted that the increase in PHY programs and NSF-wide programs, together with the need for adequate oversight of facilities requires more program director staff in order to discharge the growing responsibilities, while maintaining the quality of PHY processes and outcomes, and to be able to recruit and retain staff of the quality of the current staff. The COV also noted that PHY should continue to support research and other professional activities by program directors, as this benefits PHY and the community in multiple ways. The COV observed that the present workload required heroic dedication by the program directors and that the present situation is not sustainable without loss of quality of work, outcomes, and staffing. Particular examples were noted, including inadequate staffing for facility oversight, expansion of PHY programs without concomitant staff increases, increasing effort devoted to NSF-wide activities, the reduction of staffing for the Education and Interdisciplinary Research Program, recommendation to provide a dedicated second program director for nuclear physics, etc.

Response: The need for increased staff is appreciated by MPS and NSF. The workload problem identified by the COV is common to most NSF divisions. NSF staffing is closely controlled through the budget process, and solution of the NSF-wide staffing needs requires continued work within the context of the budget process to achieve broad consensus leading to the solution of this growing problem. COV reports are an important source of independent assessment of such issues.

PHY Response as of January 1, 2005: The need for additional PHY staff continues. MPS has allowed PHY small, temporary increases in staffing to help alleviate workload pressures in Elementary Particle Physics and in Nuclear Physics. Internal PHY reassignments have been used to provide coverage for facilities, especially LHC and RSVP, and for Nuclear Theory. The workload for the Education and Interdisciplinary Research program is being covered by assigning parts of the program to several existing PHY staff although this is not an attractive

long-term solution. PHY has analyzed its long term staffing needs and is in active discussions with OAD/MPS on how to achieve them.

PHY Response as of November 1, 2005: The need for additional PHY staff continues. PHY estimates the need for an additional 3 - 4 program officers to cover the full range of disciplinary and oversight responsibilities borne by the Division. Discussions within MPS and NSF will continue until this situation is alleviated.

ISSUE 8: Review Process

The COV noted that PHY had not yet achieved the NSF goal of making decisions on 70% of its proposals in 6 months and encouraged the division to find ways to improve its dwell-time, e.g., by timing its target date so that budget information would be available in a timely fashion.

Action: The reasons most commonly cited for this is the use of a system of mail reviews followed by panel reviews to achieve the best review, together with delays in receiving final budget numbers until half way through the year. However, there are many other NSF divisions that use the same process, yet achieve the dwell time goal. Since the COV found the combined mail review/panel review to be an extremely effective means to develop both in-depth, expert review and a broad perspective across all of the proposals under consideration, PHY will continue using this process. Much discussion went into selecting the third week of September as the PHY target date. However, the delay in obtaining the final budget for the Division may cause the Division to reconsider this target date. PHY will revisit this issue and consider an adjustment for FY 2005 (the FY 2004 date has already been set.).

PHY Response as of January 1, 2005: PHY continues to use the review system of mail reviews followed by panel reviews. By increased attention to expeditious handling of proposals, PHY has improved its dwell time statistics as follows:

	Average Months	Percent within 6 Months
FY 2002	7.39	37%
FY 2003	6.83	40%
FY 2004	5.96	60%

PHY is continuing its emphasis on improving dwell time for proposals.

PHY Response as of November 1, 2005: In FY 2005, PHY provided presumptive budget figures to the programs months ahead of the schedule of previous years. This was based on educated guesses about the final outcome of the FY 2005 appropriations process. Having budget targets early allowed program officers to make decisions more quickly, especially those decisions on what could not be funded within the available dollar levels. This resulted in significant further improvement in PHY's performance in proposal processing, without compromise to quality.

	Average Months	Percent within 6 Months
FY 2005	5.52	77%

ISSUE 9: Balance and Award Size

Quoting from the COV report: “A final issue that the COV wished to raise is that we anticipate that the Physics Division, along with the entire NSF, may be poised to see significant budget growth in the coming years. We believe that such an investment, particularly in the physical sciences, is long overdue. The strong conviction of the COV is that as the Division budget expands, it is imperative that the highest priority be given to nourishing the base investigator program which has been consistently eroding for over a decade. Most investigator grants are funded at levels inadequate to accomplish their scientific and societal goals efficiently and effectively. Notable examples are the inadequate level of graduate student or postdoc support per PI, the inadequate level of support for technical infrastructure, and the need for investigators to pursue multiple grants to accomplish their research. We consistently agreed that, given current funding levels, appropriate choices are being made in thresholds for funding and not funding grants, but in reading through the folders, we noted excellent opportunities that remained unfunded at the decision borderline.” In the FY 2003 Report Template for NSF COVs, the only unsatisfactory grade was in section A.4, where the COV answered the question “Are awards appropriate in size and duration for the scope of the projects?” with “Not Appropriate.”

Action: MPS agrees with this analysis and the importance attached to this issue by the COV. Priority will be given to PI support and to grant size. In FY 2003, PHY received a substantial budget increase, and strengthening the core disciplinary programs was given top priority. Investment in the support of individual PIs and small groups will continue to be treated with high priority in allocating future budgets. Particular attention will be paid to ensuring that graduate student and postdoctoral support is adequate.

PHY Response as of January 1, 2005: PHY gives high priority to strengthening the core disciplinary programs under all budget scenarios. In FY 2004 and FY 2005 PHY allocated approximately half of its total funds available to the core even though it meant cutting back on facilities in both years. Increasing award size is also given priority. Between FY 2002 and FY 2004 the median active award size for research grants in PHY increased from \$102K to \$113K. The average award size increased from about \$307K to about \$341K in the same period. Support for graduate students has increased significantly while support for postdocs is holding constant.

PHY Response as of November 1, 2005: The budget outlook has shifted from a growth scenario in FY 2003 to a stable scenario in FY 2006, adding significant challenge to managing priorities and to long range planning across the Division. PHY intends to continue to protect the core programs at about 50% of the PHY budget in future years. Increasing award size is also given priority. Between FY 2003 and FY 2005 the median active award size for research grants in PHY increased from \$101K to \$115K. The average award size for research grants increased from about \$200K to about \$250K in the same period. However, it should be noted that increasing grant size in a relatively constant budget environment requires a cutback in the number of awards. This is reflected in a decrease in the funding rate on research proposals from 46% in FY 2003 to 34% in FY 2005.

ISSUE 10: Instrumentation and Mid-scale Facilities

The COV heard of future plans for a program to support mid-scale instrumentation in the \$2M-\$100M range that falls between the MRI and MREFC limits. The COV commented: “This new program would include R&D in accelerator science. We felt that this new program would target an essential need in the community and we support it strongly. We do however see a window of opportunity in the range between \$100K and \$2M for a program to support equipment for individual investigators as equipment gets more expensive.” In particular, it was noted that the MRI program addressed the needs of groups of investigators, but not the needs of individual PIs.

Action: Indeed, PHY has plans to establish a separate program to consider proposals for mid-scale instrumentation, including instrumentation for laboratory experiments, R&D for large instruments like future accelerators, and facilities that fall below the threshold for MREFC consideration (10% of the MPS budget, currently ~\$100M). In response to the COV recommendations, PHY will extend the lower limit of the mid-scale instrumentation to be considered down to the lower limit of the MRI program, in order to accommodate those needs not met by the MRI program requirements. The new program would provide a means of leveraging the start-up package for new faculty on a competitive basis, thereby helping address a growing problem.

PHY Response as of January 1, 2005: PHY agrees that the need still exists for a program to address mid-scale instrumentation. There has not been sufficient funding in the last two fiscal years to warrant soliciting proposals specifically for this. However, the division is funding a limited number of projects in this cost range, e.g. VERITAS, the Atacama Cosmology Telescope, and the Auger project, with funds available under the “Physics of the Universe” budget priority and others, such as the Energy Recovery Linac, in conjunction with other divisions of MPS.

PHY Response as of November 1, 2005: PHY agrees that the need still exists for a program to address mid-scale instrumentation. There has not been sufficient funding in the last three fiscal years to warrant soliciting proposals specifically for this. PHY is funding a limited number of projects in this cost range, several in conjunction with AST, with funds available under the “Physics of the Universe” budget priority and others, such as the Energy Recovery Linac, in conjunction with other divisions of MPS.

ISSUE 11: Core Program Budget Cuts in FY 2002

The COV addressed the significant cuts in FY 2002 to the core disciplinary programs in PHY and the impacts of those cuts, as summarized by the following quote: “The danger of not having a plan to manage the operations of large facilities on a foundation wide basis was evident in FY 2002 which was the first year that LIGO operations funding was needed. Significant damage was done to the individual investigator program problem, partially as a result of the need to support LIGO operations from the base. The community lost some confidence in the NSF as a result of the severe measures that had to be taken. We support the draconian choices that the Division had to make in FY 2002, but feel it is imperative to ensure that such a situation does not arise again.”

Response and Action: This issue has been largely answered in the response to Issue 6. Part of the problem in FY2002 was the result of costs of the new PFCs established in FY 2001. MPS

applauds the willingness of the PHY DD to make such tradeoffs to fund promising new things. In the meantime, PHY has made a commitment to reverse the trend in PI support, and this has begun with a 5% increase in FY 2003 to all core programs that support individual PIs. The budget increase in FY 2003 made this easy in FY 2003, but it is the intention of PHY to continue this growth with high priority.

PHY Response as of January 1, 2005: As noted above, PHY is holding the core PI programs to about 50% of the division total. While this does not remove the possibility of cuts to the core programs all together, it does mean that facilities and centers will not grow at the expense of the PI programs.

PHY Response as of November 1, 2005: PHY is holding the core PI programs to about 50% of the division total. In FY 2005, various priorities required a cut of about 7% to the general base programs. This cut enabled PHY to emphasize Physics of the Universe and Theoretical Physics in its core programs while honoring commitments to LHC operations at the expense of other facilities operations.

ISSUE 12: Stewardship of Emerging Activities

The COV found the need for more stewardship of emerging activities, particularly biological physics and physics education research. Although applauding the formation of a new program in Biological Physics, as suggested by the 2000 COV, the COV did not find evidence of increased emphasis on physics education research (PER), also noted by the 2000 COV. Moreover, one of the two PER proposals was found to have been reviewed by reviewers who were not expert in this type of activity. Suggestions included holding workshops to help define and extend the scope of emerging areas, expand the reviewer base in order to obtain reviews from people more expert in the emerging fields, and make sure that there is enough staff time available to cultivate emerging areas.

PHY Action: PHY will pursue each of the suggestions and report progress to the 2006 COV. In fact MPS as a directorate is already engaged in planning for emerging areas, including biology and education related ones.

PHY Response as of January 1, 2005: PHY announced a program in Biological Physics in the Dear Colleague Letter for FY 2004. This program, although still relatively small, is being given priority in the FY 2005 allocations. PHY intends to continue its emphasis on this area in FY 2006. PHY is still examining its appropriate role in support of physics education research.

PHY Response as of November 1, 2005: PHY will continue emphasis on Biological Physics and is working with EHR to establish our optimal role in Physics Education Research.

ISSUE 13: Educational Programs and Staffing

The COV subpanel on Educational and Interdisciplinary Research (EIR) Program noted that the staffing for EIR had been reduced to half an FTE, and that the current incumbent was located off site. Further, the subpanel stressed the need for expanded effort in PER research, extending the groups impacted by the REU program to younger students, teachers, underrepresented groups, etc., and increased investment in EIR.

Action: Reduction of the staffing level for EIR was made in response to the increasing demands of new programs, related to the general staffing issues noted above. The incumbent did such an excellent job while an IPA here in FY 2002 that PHY decided to continue the arrangement after his return to his home institution. There have been drawbacks to the remote arrangement, resulting purely from the off-site arrangement. This will be taken into account in future appointments. PHY will undertake a review of EIR educational activities with an eye on program balance, scope, and funding levels, within the context of the whole PHY portfolio, with a report due in time for the 2006 COV.

PHY Response as of January 1, 2005: PHY has distributed the program responsibilities of the Education and Interdisciplinary Research program among several program officers in the division. We have needed the position formerly assigned to EIR for other urgent staffing requirements. PHY agrees that a program officer for EIR is desirable and has incorporated one in planning for future staffing needs.

PHY Response as of November 1, 2005: PHY agrees that a program officer for EIR is desirable and has incorporated one in planning for future staffing needs. Meanwhile, various PHY program officers are conscientiously handling the distributed responsibilities for EIR.

ISSUE 14: Advisory Mechanisms

The COV noted the valuable advice available from the Nuclear Science Advisory Committee (NSAC) and the High Energy Physics Advisory Panel (HEPAP), which provide NSF and DOE with advice in nuclear physics and particle physics, respectively; and they noted the MPSAC as a source of advice with a much broader perspective. The COV expressed concern about a mechanism for advice of the other programs of the division, since the divisional advisory committees were eliminated in the early 1990's.

Response: PHY is responsible for a very broad portfolio and receives extensive advice on many parts of it. The sources of advice include NSAC, HEPAP, NRC reports, ad hoc workshops, SAGENAP, NAAAC, interagency working groups, executive committees of APS divisions, etc. While PHY does not have its own advisory committee, it does have the benefit of advice by the triennial PHY COV, which reviews all aspects of the division in fair depth. PHY considers the above-cited advisory mechanisms adequate for most purposes. In addition, targeted workshops and reviews, such as those suggested by the COV will be used to fill in gaps in the advisory infrastructure.

PHY Response as of January 1, 2005: PHY continues its participation in the advisory mechanisms cited above. MPS is particularly active in implementing the NRC reports "Connecting Quarks with the Cosmos" and "Frontiers in High energy Density Physics" and the HEPAP report "Quantum Universe". PHY participated in MPS Cyberscience Workshop and the MPS Theory Workshop.

PHY Response as of November 1, 2005: PHY continues active participation in the interagency (DOE + NSF) advisory groups HEPAP and NSAC, and is becoming increasingly involved in the AAAC (NSF + NASA + DOE). SAGENAP has been subsumed under these groups. Ad hoc

advisory panels are convened, as needed, c.f. the HEPAP Subpanel on the Scientific Case for RSVP.

ISSUE 15: Plasma Physics

The COV subpanel on the Atomic Molecular and Optical Physics Program noted the following: “This year a programmatic decision at ONR has reduced the Navy’s funding of basic plasma science to zero. This is a very serious blow (1/3 of the total funding) and in the short term makes matters very difficult. The DOE-NSF program is the only source of support for plasma science and it is imperative that the NSF addresses the ONR shortfall in its future funding profile.”

Action: MPS and PHY are aware of the importance of basic plasma science, the ubiquity of plasmas in nature, and the neglect of basic plasma physics research in universities brought about by the emphasis of government on fusion energy and stockpile stewardship. While the division cannot simply address the programmatic decision of another agency, it is doing several things to address the needs of and opportunities for the plasma science community as so convincingly stated by recent NRC reports and workshops. PHY is committed to the DOE-NSF partnership in plasma science, as is DOE-OFES. PHY is about to support a PFC in plasma science with co funding of national laboratory components of the work by DOE-OFES. In addition, the interagency working group on the physics of the universe, which is a result of the NRC report “From Quarks to the Cosmos,” is addressing this issue on an interagency basis. PHY shares stewardship responsibilities for plasma science, particularly on campus, and through the activities cited above, will attempt to bring this field into a healthier state. The progress will be reviewed by the 2006 COV.

PHY Response as of January 1, 2005: PHY initiated the PFC “Center for Magnetic Self-Organization in Laboratory and Astrophysical Plasmas” at the University of Wisconsin in September 2003. It is successfully building its program and has become well known and respected in basic plasma physics. PHY continues implementing the NRC reports “Connecting Quarks with the Cosmos” and “Frontiers in High energy Density Physics” and partnering with DOE in plasma science.

PHY Response as of November 1, 2005: A new competition for the NSF/DOE Partnership in Basic Plasma Science and Engineering (NSF 05-619) is being held in FY 2006.

ISSUE 16: Goals and Outcomes for Educational Grants

The COV reiterated the general call to establish clearer goals for and assessment of programs in cases where this is appropriate. As mentioned above, increasing diversity in the science community is one such case. Another is educational programs, where an attempt to set appropriate goals and perform assessments is encouraged by the COV.

Action: Assessment/evaluation is particularly important for educational projects. A great deal of expertise in the evaluation of educational programs and projects exists in the EHR Directorate. MPS will consult with appropriate individuals in that Directorate on this issue.

PHY Response as of January 1, 2005: PHY is working jointly with EHR in evaluating proposals in physics education research. We rely heavily on their expertise in these areas.

PHY Response as of November 1, 2005: PHY is working jointly with EHR in evaluating proposals in physics education research. We rely heavily on their expertise in these areas.

ISSUE 17: Assessment of Large Group Grants

The COV subpanel for EPP suggested that “Writers of umbrella proposals should be instructed to state clearly the contribution of each member of the proposal and reviewers should be asked to draw attention to proposals that fail to do so.”

Action: MPS and PHY are in complete agreement that all researchers in group awards should be critically reviewed during the review of any proposal for a group grant. Review panels are now all instructed to review the contributions of individual members of a group proposal. Actions such as eliminating support for one individual in a group grant have resulted. However, proposals do not uniformly provide the information needed to address this issue, and PHY will work to improve the compliance with this need through interactions between PIs and program directors and, possibly, some written form of communication, e.g., Dear Colleague letter or letters to PIs of group awards. This topic is important and will be revisited at the next COV.

PHY Response as of January 1, 2005: PHY program officers in Elementary Particle Physics encourage PIs on large proposals to identify the research program of each senior faculty member of the group. During site visits for proposal reviews, each senior person is asked to make a presentation on his or her work. Requests for such specificity are handled on a case-by-case basis but program officers would like to assure that all group proposals are broken out to identify the individual contributions in sufficient detail that reviewers can differentiate the contributions of individuals in the group. Further attention will be given to making this known to the community.

PHY Response as of November 1, 2005: PHY is continuing its efforts along these lines.

ISSUE 18: Management of Large Facilities

The COV noted “The LHC project involves management and coordination that is international, interagency, and interdivisional in scope. We do not see the necessary resources in the Division to continue to accomplish this effectively as other large projects (for example, RSVP) are initiated.”

PHY Action: PHY is in agreement with this observation and notes that the general policy to have a full time NSF program director provide oversight to all MREFC and other major facilities is not satisfied at this time. The implementation of NSF goals for facility oversight is under active review, and PHY will keep MPS management fully informed concerning the division’s staffing needs.

PHY Response as of January 1, 2005: PHY has been able to expand staffing for the Elementary Particle Physics program by reassigning existing staff and positions and by a small increase for a part-time program officer. PHY has currently assigned Jim Whitmore responsibility for LHC and Marv Goldberg responsibility for RSVP. Each of these also has other program responsibilities so this does not wholly cover NSF’s intention of a full-time, dedicated

program officer for each MREFC project. An IPA and an additional 0.4 FTE fill out the current staffing of the EPP program.

PHY Response as of November 1, 2005: PHY currently has a program officer assigned to the LHC operations. RSVP is in its phase out period. DUSEL is a possible future MREFC project that requires intensive oversight by NSF staff.

This format lends itself to tracking and assessment by PHY, MPS, MPSAC and the 2006 COV.

APPENDIX: Acronyms

AMOP	Atomic, Molecular, Optical, and Plasma Physics Program
APS	American Physical Society
BE	Biocomplexity and the Environment
CAREER	Faculty Early Career Development
COV	Committee of Visitors
DOE	Department of Energy
EHR	Directorate for Education and Human Resources
EIR	Education and Interdisciplinary Research
EPP	Elementary Particle Physics Program
FACA	Federal Advisory Committee Act
FTE	Full Time Equivalent
HEPAP	High Energy Physics Advisory Panel
IPA	Intergovernmental Personnel Act
ITR	Information Technology Research
LHC	Large Hadron Collider
LIGO	Laser Interferometer Gravitational Wave Observatory
MPS	Directorate for Mathematical and Physical Sciences
MPSAC	MPS Advisory Committee
MREFC	Major Research Equipment and Facility Construction
MRI	Major Research Instrumentation
NAAAC	National Astronomy and Astrophysics Advisory Committee
NSAC	Nuclear Science Advisory Committee
NSCL	National Superconducting Cyclotron Laboratory
OFES	Office of Fusion Energy Sciences
OMA	Office of Multidisciplinary Activities
OMB	Office of Management and Budget
ONR	Office of Naval Research
OSTP	Office of Science and Technology Policy
PER	Physics Education Research
PFC	Physics Frontier Centers
PHY	Division of Physics
PI	Principal Investigator
REU	Research Experiences
RSVP	Rare Symmetry Violating Processes
SAGENAP	Science Advisory Group for Experiments in Non-Accelerator Physics