

Minutes
MPS Advisory Committee Meeting
April 2-3, 2009
National Science Foundation

Thursday, April 2, 2009

Morning Session

Welcome and Introductions

Dr. Iain Johnstone (Stanford University), Chair of the Mathematical and Physical Sciences Advisory Committee (MPSAC) opened the meeting at 9:50. Paraphrasing the Dicken's "Tale of Two Cities, Johnstone noted that "It is the best of times and the worst of times", with the world and many of its institutions experiencing severe financial challenges. NSF has an unprecedented increase in funds due to one-time funds from ARRA. However, there will be challenges and complexity with implementing the American Recovery and Reinvestment Act (ARRA) at NSF. He noted that NSF must respond swiftly and face heavy accountability with respect to the one-time boost provided by ARRA. NSF would have to cope with making awards with no additional staff.

Johnstone reviewed the agenda for this meeting. The meeting would focus primarily on FY 2010 and FY 2011 budget concerns. Dr. Tony Chan, the Assistant Director for MPS, would give an overview and introduction to the budget status. The other topics that would be discussed today would be a discussion of the Division of Physics Committee of Visitors (COV) Report and a presentation by Dr. Edward Seidel, Director of the Office of Cyberinfrastructure. He then had members of the MPSAC and attendees introduce themselves, and Dr. Morris Aizenman provided some logistical information concerning the meeting.

Remarks by MPS Assistant Director

Chan welcomed attendees on behalf of the Foundation. He provided an update of recent personnel changes within NSF. Dr. Jack Lightbody, the Deputy Assistant Director (DAD) had retired from NSF and Dr. Clifford Gabriel had been the Acting DAD since January. Dr. Gabriel had been with NSF for a few years and had come to NSF from the Environmental Protection Agency (EPA). His background is in botany and this allows him to provide a fresh unique perspective on MPS activities. A search was underway for a permanent DAD for MPS, and it was hoped that this search would conclude successfully within the next two months. Dr. Craig Foltz is Acting Division Director (DD) for Astronomy. The search for a new Division Director had not been successful to date. Dr. Kathie Olsen had stepped down as Deputy Director and Dr. Cora Marrett was now the Acting NSF Deputy Director. Dr. Marrett was, until appointed as Acting Deputy Director, the Assistant Director for the Education and Human Resources Directorate (EHR).

The FY 2009 Omnibus Bill had been passed by Congress and signed by the President. The Bill provided \$6.5 billion for NSF, a 7.2 percent increase from FY 2008. The distribution within NSF of these funds still had to be determined, but MPS Divisions would see an increase in FY 2009.

MPS FY 2009 areas of emphasis are Science and Engineering Beyond Moore's Law (SEBML); Cyber-enabled Discovery and Innovation (CDI); the MPS Life Sciences Interface (several MPS divisions are establishing connections to the Directorate for Biological Sciences (BIO) and others with respect to this interface; Quantum Information Sciences (QIS); and Preparing the Workforce for the 21st Century (young investigators, undergraduate students, K-12 science educators, broadening participation, and ACI Fellowship Programs).

With respect to the America Recovery and Reinvestment Act (ARRA) the legislation provides \$3.0 billion to NSF. Of this amount, \$2.0 billion is for Research and Related Activities (R&RA), \$300 million is for Major Research Instrumentation (MRI), \$200 million is for Academic Research Infrastructure (ARI), \$100 million is for the Education and Human Resources Directorate, and \$400 million is for the Major Research and Facilities Construction (MREFC) account.

NSF released important Notice 131 on March 18, 2009. This Notice stated that ARRA grants will be standard grants; that priority will be given to new principal investigators (definition pending) and high-risk/high-return research; that previously declined proposals that were not funded solely due to lack of funds could, at program manager's discretion, be funded but that this applied only to proposals declined in FY 2009 (*i.e.* after October 1, 2008). In addition, there would be a higher degree of accountability on ARRA award, with a 'special award conditions' letter included in the terms and conditions of each award. There would be no supplements to existing grants under ARRA. Of special note is that there will be no mingling of ARRA with normal budgetary money.

With respect to NSF's FY 2010 Budget Request, the President had submitted his high-level budget request in February/March and a detailed Office of Management and Budget (OMB) request to Congress is still forthcoming. However, the NSF budget request is a 16% increase over the FY 2008 amounts. Administration science and technology priorities are science, energy and the environment; increased support for biomedical research, physical science and engineering; increased support for high-risk/high-payoff research; the promotion of STEM education (from science literacy to Graduate Research Fellowships); climate change, sustainable development, new and cleaner sources of energy; the reduction of greenhouse gas emissions; and national security and international affairs.

Chan then discussed the MPS Strategic Co-Investment (SCI) mechanism that had been implemented in the FY 2010 Budget Request. It assumes that the MPS budget grows at reasonable rate (*e.g.* 6% historical), that the MPS Office of Multidisciplinary Activities (OMA) co-invests in research and development for new facilities at approximately 15% of total annual OMA budget; that an open competition is held among all divisions (to get best ideas and to be mindful of balance/distribution across divisions); that a maximum of 1% of MPS budget is invested in the SCI each year; that investments are balanced approximately equally between facilities development and new program/activities; that investments from the Directorate for SCI stay in the base of the respective Division, and that Divisions make co-investments in these activities.

Planning for the FY 2011 budget is expected to begin budget in May/June 2009 timeframe, and NSF expects to submit a budget to OMB in early September 2009. Chan was looking forward to receiving suggestions from the Advisory Committee on possible FY 2011 activities.

Division of Physics Committee of Visitors Report and Discussion

Dr. Sidney Wolff, President of the Large Synoptic Survey Telescope Corporation, made a presentation, via teleconference, of the review of the Division of Physics (PHY) by the Committee of Visitors (COV) that she had chaired in February 2009. Chan, Assistant Director of MPS, had charged the COV to examine the integrity and efficiency of the Division's review process; the quality of the results of NSF's investments that appear over time; and the relation between award decisions and PHY/NSF-wide goals. Wolff stated that the COV endorsed the use of combined mail and panel review and noted: "It is nice to see something that works the way it is supposed to and that works well. That is rare." The COV found that difficult choices must be made, but when seen in context, the choices were justified. The COV raised concern about shrinking budgets and declining success rates. In terms of strategic issues there are many trends and opportunities to which PHY has responded; *i.e.* the areas of Physics of Living Systems, Numerical Relativity, and Gravitational Research. The COV stressed that all scales and sizes of awards are appropriate, but that the current balance of funds with ~55% individual investigator awards (IIA) and no more than ~10% to the Physics Frontier Centers (PFC) should be maintained. The COV was impressed with the seriousness that the issues of diversity and inclusiveness were addressed by all; reviewers and program directors alike. The COV members believed that a high priority for new funding opportunities should be mid-scale Instrumentation; but only after the success rates and award size for the current programs were fixed. PHY was praised for its life cycle planning for facilities. The COV noted the need for partnerships. Wolff stated the COV found that shuttering older facilities alone would not provide the whole operating costs for new facilities. The COV found that the Laser Interferometer Gravitational Wave Observatory (LIGO) could serve as a model for engaging the community. Large facilities should have a full engagement with the university community. LIGO partners with PHY in reviewing proposals for science being undertaken by the users of LIGO.

The COV noted that the handling of interdisciplinary proposals currently depends upon the personal relationships between program directors in NSF. Wolff stated the COV attempted to develop some suggestions

for improved handling; perhaps such proposals could be looked at by an “incubator” or perhaps funding of such proposals could be encouraged by co-funding from a higher level. However, any solution would need monitoring to see if it provided the intended results.

Wolff stated the COV found the Faculty Early Career Development (CAREER) program placed too much emphasis on creativity and innovation in education. The members noted that there is already a large body of physics education research and CAREER applicants should be able to tap into that body of research in devising their education plans. The COV members recognize that education is a key component, but there should be more flexibility in the criteria; allowing the young researcher to become an experienced educator by leveraging existing research and programs. Another issue the COV had with the CAREER program was that the present minimum funding level penalized those from predominately undergraduate institutions as it is difficult for such applicants to meet the minimum requested budget.

The COV recognized there are problems resulting from the current economic environment; many institutions are operating under hiring freezes. As an example, while an institution may like to hire a promising young researcher, they are not able to. There is a concern that such young researchers may decide to leave physics/science. The COV members discussed several possible actions, but quickly realized each would have unintended consequences. Therefore they did not have any recommendations for NSF.

Dr. Daniela Bortoletto, a member of the MPSAC and a member of the PHY COV, reiterated what Wolff had presented. She stated that all sub-panels recognize the need for and endorse a mid-scale instrumentation funding opportunity; but only after the low grant size is addressed. As an example, in the PHY theory program the grants do not provide enough funds to support one full student. She also reiterated that in CAREER there is too much emphasis on innovative education. In addition she noted the COV was concerned about the effect of the present economic environment, which is resulting in hiring freezes, on the physics/science workforce.

During the discussion of the COV report Dr. Barbara Finlayson-Pitts said that the same concerns about the need for an innovative educational component has been raised in the chemistry community. She felt the original intent of CAREER was to develop better teachers. Now assistant professors struggle to be innovative/creative in both their scientific research and their educational plans. She encouraged NSF to evaluate whether the present situation is working. Dr. Denise Caldwell, the Deputy Division Director for PHY, said that ABT Associates is producing a report on CAREER issues/outcomes. Wolff said that while the COV liked the emphasis on integrating research and education in CAREER awards, it was the need to be innovative/creative in the educational component that COV members questioned.

Dr. Eric Cornell asked what was meant by mid-scale Instrumentation. Dr. Joseph Dehmer, Division Director for PHY, answered that it would include items costing a bit under \$1 million up to approximately \$100 million. Such a program would include gamma-ray telescopes and detectors as well as laser systems. PHY is thinking of a capitalization fund to address scales less than the MREFC level.

Dr. Geoffrey West commended the COV for recognizing the problems with reviewing interdisciplinary proposals. He was concerned that NSF is not set-up to handle proposals that involve for example physics and the social sciences, where there are tremendous cultural divides. He also believed such proposals did not receive a true “peer review” since they are evaluated by researchers in the separate disciplines. Wolff responded that the COV did not solve how interdisciplinary proposals should be handled, nor was it clear to the COV how deep a problem it was. In addition it was not clear to the COV how to handle such proposals within a formal structure, and thus the suggestion for “venture capital” within NSF; *i.e.* an incubator. Dr. Clifford Gabriel, the Acting Executive Officer of MPS, responded that an NSF interdisciplinary working group has been formed and that it is hoped a roadmap will be developed for handling such proposals. Dr. Celeste Rohfling, head of the MPS Office of Multidisciplinary Activities (OMA), responded that synthetic biology in NSF is currently experimenting with the Sandpit review process of the United Kingdom (UK). She also noted that the Chemistry Division is reorganizing to facilitate interdisciplinarity within the division. Dr. Theresa Maldonado felt that the review of the Integrative Graduate Education and Research Traineeship (IGERT) proposals provided a good example of handling interdisciplinary projects.

The discussion moved onto the question of peer review, with West asking why there should be peer review for transformative/high risk research. A visitor, Dr. James Murday a former program officer at the Office of Naval Research (ONR), stated that ONR's peer review system consists of only the program officer and such a system nullifies the problems with NSF's peer review of interdisciplinary and high-risk proposals. Dr. Gabriel responded NSF has the EAGER (EARly concept Grants for Exploratory Research) mechanism to support the early stages of potentially transformative or high-risk/high-payoff research. EAGER proposals undergo an internal merit review.

The MPSAC unanimously accepted the Committee of Visitors report on the Division of Physics. The report and the NSF response to the report may be found at <http://nsf.gov/mps/advisory/cov.jsp>.

Presentation by Dr. Edward Seidel, Director, Office of Cyberinfrastructure

Dr. Edward Seidel, Director, Office of Cyberinfrastructure (OCI) described activities of that office. He began by providing a history of how computing power had progressed over the past thirty years by describing the history of the simulation of colliding black holes. He described the history of simulation of colliding black holes over 30 years. At present network bandwidth on campuses is a serious issue, and OCI wants to support a computational science environment. Issues described during his presentation included the importance of theory as input for software, as well as security. Academics tend not to work in this area and there is, of course, the issue of confidentiality. With respect to intellectual property issues associated with software, universities have different policies.

Lunch Adjournment Followed by Divisional Breakout Sessions

MPSAC members had lunch with the MPS Divisions in the divisional breakout sessions. Topics discussed during these sessions included long-range planning issues and FY 2011 budget ideas.

Thursday, April 2, 2009

Afternoon Session

The MPSAC reconvened in plenary session at 4:15 PM.

Reports from Divisional Breakout Groups

Division of Astronomical Sciences (AST)

Robert Williams gave the report on the AST breakout session. The main topics that were discussed were the search for an AST Division Director, the ARRA plan, the astronomy Decadal Survey, and large-scale facilities.

With respect to the Division Director search, the search conducted over the last six months had resulted in no one accepting the position, so the process had to begin again. The Division has two open program director positions, so AST staff is doing heroic work to keep up. Chan commented that an effort is underway to renew the search, that MPS was giving high priority to this important recruitment and that the community was involved through the search committee's outreach efforts.

The ARRA plans have been submitted to OMB for approval. Williams expressed concern that the approval was taking so long, since the new awards would help fund postdocs. AST anticipates that ARRA funds will create flexibility in the use of FY 2009 appropriated funds. He also noted that the NSF policy concerning supplements is not well understood and should be clarified.

The "Decadal Study" chaired by Roger Blandford is now underway. A preliminary report is expected in about a year.

Among the large facilities discussed was the Atacama Large Millimeter Array (ALMA), which is proceeding very well. Plans to make ALMA available to the broader community are being made. For the National Optical Astronomy Observatories (NOAO), the cooperative agreement comes due this autumn. The solar operation will

be split off for the new Advanced Technology Solar Telescope (ATST) solar observatory. The Senior Review recommended a cut in operation costs for the Aricebo Observatory, which will be recomputed in March 2010. There could be a change in scope at that time. The National Radio Astronomy Observatory (NRAO) operates ALMA, and it will not be recomputed during the ALMA construction period. Gemini is operated by AURA with 50% funding from the US. The Large Synoptic Survey Telescope (LSST) next design review has been deferred to Fall 2009 due to AST staffing shortages and higher priority going to the ATST review. This delay is unfortunate.

In response to William's encouragement that AST staff be involved in the Division Director recruitment process, Chan stated that staff have been involved through a meeting on this subject. Williams suggested that such a meeting should be repeated.

Division of Chemistry (CHE)

Dr. William Jorgensen gave the report on the CHE breakout session. He described the reorganization being carried out in CHE. He indicated that the traditional structure (analytic, organic, physical, *etc.*) was antiquated and did not reflect new interfacial areas of emphases. The new structure reflects a new way of expressing the community's interests. This change is really modernizing the portfolio structure. It has been publicized at the American Chemical Society (ACS) town hall meetings and discussed in a *C&E News* editorial. He expects that this will have a profound effect on chemistry departments. The breakout members of the Advisory Committee support the reorganization. CHE would like the restructuring to become effective July 1, 2009 -- the start of the next proposal cycle.

Jorgensen then gave a quick survey of other topics, all of which were viewed positively by Advisory Committee members of the breakout session – broader impacts, FY 2009 and 2010 budgets, the Chemical Research Instrumentation and Facilities (CRIF) program and instrumentation, the beneficial ARRA enhancement of Major Research Instrumentation (MRI) program, and the next CHE COV to be held in February 2010. He noted that the CHE Division Director, Luis Echegoyen, had extended his term of service as Division Director to Fall 2010 and this will necessitate a search for a new Division Director.

Most of the discussion during the breakout session was devoted to planning for FY 2011 and ongoing trends in chemistry. Breakout session AC members expressed some frustration with the Department of Energy (DOE) stamp on energy. Energy has been central to chemistry for 150 years; and it enters into all of CHE's new programs. NSF should be proud of the contributions by CHE to energy; and the Division of Materials Research (DMR) should join in a united front in promoting energy research. Chemistry is important in lowering dependence on oil; and there are many other examples involving imaging, nanoscale phenomena, sensors, detectors, all depending upon workforce development.

Dr. Hector Abruna commented that MPS should use strategic investments to cast energy as a multidivisional effort to elevate the importance of the topic. Chan indicated that the CHE realignment was under review; and that it is supported by MPS. He also noted that the relationship with DOE is changing for the better and that the Office of Science and Technology Policy (OSTP), OMB, and the Office of the Director recognize that "the pie is not fixed" and that agencies should cooperate in this activity. He suggested that the Advisory Committee discuss this with Jean Cottam after her talk tomorrow.

Division of Materials Research (DMR)

Dr. Monica Olvera de la Cruz gave the report on the DMR breakout session. She noted that DMR supports interfaces among different fields, all related to materials. They support several modalities, e.g., Materials Research and Engineering Centers (MRSEC), principal investigators, mid-sized groups, and are considering cyber-enabled groups. DMR's facility costs are increasing; and there is concern about impact on a balanced portfolio. They are part of the CHE-DMR-DMS Solar Energy Initiative (SOLAR) strategic co-investment with the Division of Mathematical Sciences (DMS), CHE, and DMR as its participants. This approach leverages DMR funds effectively.

DMR has an effective diversity activity called Partnerships for Research and Education in Materials (PREM) for minority serving institutions, and this has now been extended to female serving institutions. The ARRA funds could be used to initiate new types of programs such as postdoc programs. Chan commented that one purpose of the SCI model was to deal with this problem and that there could be co-funding from other directorates and agencies.

Division of Mathematical Sciences (DMS)

David Keyes gave the report of the breakout session for DMS. He started by noting that April is Mathematics Awareness Month and that climate had been the focus of last year's math month. The breakout session discussion focused on budgets, science drivers, and the COV response update. How to deal with the "bump" of ARRA funding had been discussed, and the group noted that the use of normal base funds for postdocs at institutes partially addresses the jobs situation. DMS institutes are up for renewal/recompetition. It is expected that four to six institutes will be supported that are larger than existing ones. A couple of new institutes are expected to be supported.

The SCI model was discussed, involving a 1% investment by MPS in strategic themes, and there is support from this activity in DMS for discovery networks, sustainable energy, chance and randomness, and simulations. An idea that was discussed was for a new activity involving "Chance, Randomness, and Predictability." This would be an extremely cross cutting activity to distinguish it from the regular programs.

With respect to institutes, the issue of balance within the portfolio came up. The breakout group found that the institutes reflect the interests of the community, and input/controls exist in the form of input from the community and the recompetition process. DMS conducted an internal institute review and found that the communities of the different institutes were distinct, that there was a natural saturation in the number, and that the underrepresented groups were more represented in institute activities than in the DMS community generally.

PRISM (Proactive Recruitment of Introductory Science and Mathematics) is a new program with a solicitation that is currently underway. It looks promising. The breakout session group was happy that Peter March would stay for a fourth year.

Chan commented that the idea of funding postdocs through the institutes is a good example of a divisional initiative that was made possible by the headroom provided by ARRA.

Division of Physics: Eric Cornell presented the report on the PHY breakout session. He said there had been a lively discussion. The breakout group had discussed interdisciplinary research and the ways it is addressed. Means to address proposals that do not fit into one of the existing programs were discussed, and PHY was open to an idea to have an interdisciplinary champion look at proposals that lack serious "peer" review. The importance of PHY to sustainability energy was discussed, with clear roles in such areas as complex systems, plasma science, nuclear waste transmutation, and nuclear energy workforce. The Academic Research Instrumentation (ARI) solicitation was discussed, mainly in an attempt to identify its dimensions. The solicitation is not public yet, but certain notions like "not new building" and not "scientific equipment" helped to identify the options in between as ways of renovating the academic research infrastructure. The strategies for use of the ARRA were discussed. There are constraints, e.g., fast and high standards; and there are priorities, e.g., new PIs and high risk/high payoff. The idea of creating "headroom" in FY 2009, FY 2010, and FY 2011 was endorsed.

PHY had plausible plans for planning for facilities, including shutting down old facilities beyond their scientific prime. John Peoples added that the life cycle planning for the Deep Underground Science and Engineering Laboratory (DUSEL) seemed plausible. He also said he liked the new programs, because they grew from the bottom up.

General Discussion: At the close of the presentations from the breakout groups discussion centered around the amount of ARI support from ARRA. Jorgensen pointed out that \$200 million amounts to about \$4 million per state, which is not a lot of money. The ratio of requests to amount available will be very high. Dr. John Peoples commented that this was one of the riskiest things to do. It could be easily viewed as set-aside funds, but it is

needed. Dehmer indicated that the estimated need is approximately \$3.9 billion and any projects that would probably get funded will need to be very far along; one cannot start designing and costing now.

Johnstone suggested two topics for further discussion: (1) Continue discussing the various budgets that had been presented; or (2) continue with the presentation on facilities that Chan had prepared but not given. Abruna asked for a clarification on the NSF policy with respect to supplements from ARRA funds. He had understood that supplements would not be permitted, but he had also heard that some Divisions were planning on making supplementary awards. Peter March pointed out that the supplements referred to were coming from FY09 appropriations funds, not ARRA funds. Dr. Zakya Kafafi added that there are also opportunities for supplements related to centers and facilities.

Maldonado asked if it would be possible to use the final 30 minutes to cover some of the topics for discussion with Dr. Bement. Johnstone pointed out that there would be time for such a discussion the following day, as two open discussion sessions are available. Also, it might be a best to hear the presentation from OSTP first. He suggested that the panel use the final 30 minutes of the present meeting to hear the presentation on the facilities plan.

Chan's introduction to this topic noted that facility planning is part of the role of the MPSAC. There is an existing subcommittee of the MPSAC charged with this. Dr. Michael Witherell, the former MPSAC Chair, heads this subcommittee. This is also the purpose of the position currently held by Wayne van Citters. The plan that he would now present had also been presented to the Major Research and Engineering Facilities Construction (MREFC) panel at the NSF.

Issues that involved facility planning were that both the costs of total design and development and the annual operations costs for even a single \$1 billion project would be of the order of \$100 million, which was an MREFC-scale expenditure that would distort division budgets. Furthermore, a redistribution of recovered operations costs from phaseouts would not cover future needs. As a result MPS requires a directorate-wide cooperative stewardship function and resource reallocation scheme. The December 2008 meeting of the National Science Board (NSB) discussed two possible changes to the MREFC process: (1) NSB prioritization of candidate MREFC projects following critical design review (CDR), rather than the current practice of preliminary design review (PDR); and (2) possible augmentation of the sponsoring Division budget, beginning during the preliminary design phase, following NSB assessment and endorsement.

The planning model that had been developed took into account the cost of operating existing facilities, the projected closings of facilities, community advice, *e.g.*, the AST Senior Review, division projections based on current priorities, the costs of design and development for new facilities, the operations cost for new facilities, and realistic budget projections.

Chan then showed graphs giving the estimated total research and related activity costs for existing and developing MPS facilities to FY 2022 and how these costs might be handled. He stated that MPS facilities planning allowed the MPS Directorate to assess the problems and investigate possible solutions to funding these projects. He noted that operations costs for facilities were a challenge and that the Strategic Coinvestment Initiative (SCI) approach met this problem. Also, rising design and development costs for projects were an increasingly critical problem.

This presentation was followed by a presentation on the status of implementation planning with respect to the report of the NSF Advisory Panel on Light Source facilities that had been received and accepted at the November 2008 meeting of the MPSAC. Chan reviewed the charge to the advisory panel. The panel was charged to provide guidance toMPS regarding future NSF stewardship and/or partnership in support of coherent light source facilities and instrumentation. It was asked to advise on all possible outcomes. NSF had no hidden agenda, wanted informed community input, and was not seeking guidance for any specific facility or proposal.

Chan then reviewed the recommendations of the panel, which were the following:

- The United States needs to move more aggressively in this new area;
- NSF plays a stewardship role in the design, construction and operation of university-based 4th generation light sources;

- NSF stewardship must reflect the breadth of the science and engineering and must therefore involve multiple Directorates and Divisions, and partnership with other agencies;
- Continue active user research programs where next-generation light source R&D work is being pursued; and
- Concurrently support university-based research on advanced concepts (“table top” sources) for light sources

In response to these recommendations towards an NSF stewardship role, the elements of an emerging DMR life-cycle plan were the following: MPS would :

- Capitalize on skill sets and innovation base at university facilities;
- Take into account development programs, world-wide;
- Continue user programs where next-generation light source R&D is being pursued;
- Provide adequate support for R&D program leading to 4th generation light sources;
- Utilize competitive mechanisms to engage best talent and ideas;
- Identify the resources for development and operation of 4th generation light source; and
- Structure appropriate intra- and inter-agency partnerships.

Stewardship challenges involved intra and interagency cooperation, the impact on portfolio balance of DMR and MPS, operations cost, and determining the best mechanism for supporting facilities for multidisciplinary research that cut across multiple directorates and divisions? MPS would bring the plan to the August NSB meeting.

In the discussion that followed this presentation Kafafi stressed that support for a light source is not something DMR can do alone. Cornell felt that NSF and the US had missed an opportunity with respect to activities in Shanghai with respect to light sources. Abruna noted that they are hiring accelerator builders trained in the US. Bortoletto asked about what would happen to the Cornell High Energy Synchrotron Source (CHESS) when the Cornell Energy Storage Ring (CESR) support phases out and Kafafi responded that this was a problem. DMR has been funding, and continues to fund, CHESS at about \$5 million per year. But, with the PHY phaseout of support, DMR now had to face the prospect of supporting CESR operations at about \$20 million per year. Olvera de la Cruz asked if ARRA funds could be used for this and Chan replied that this was, in principle, possible.

Adjournment

The meeting was adjourned at 6:00 P.M.

Friday, April 3, 2009
Morning Session

The MPSAC convened at 8:45 A.M.

Report from CEOSE

Johnstone, MPSAC Chair, invited Maldonado to report on activities of Committee on Equal Opportunities in Science and Engineering (CEOSE) that are of interest to MPS. Maldonado is the MPS liaison to CEOSE and currently chairs the CEOSE committee. CEOSE meets three times per year and has *ad hoc* committees and working groups. Some of the *ad hoc* committees have focused on widening creative pathways to science, technology, engineering and mathematics (STEM), institutional transformation, persons with disabilities, and broadening the participation of Native Americans in science and engineering.

CEOSE is required to submit ten-year and biennial reports to Congress, with the 2005-2006 biennial report now available. Maldonado distributed copies of the 2005-2006 biennial report, and then reported on highlights of the February meeting and on future plans of CEOSE.

The February meeting was quite dynamic. NSF has been collecting data on doctorates earned and on participation by minorities in science research and education activities in highly aggregated form, due to privacy concerns. In this highly aggregated form, however the data was not very useful to pinpoint what may be going on in particular fields, or by gender, as opposed to minorities. Possibilities of disaggregating the data were discussed at the CEOSE meeting. NSF agreed to collect disaggregated data on participation in various fields by underrepresented minorities and women (e.g. recipients of PhD's, etc.) An article, summarizing the discussions and giving more details was published in one of the February issues of Science. Several MPSAC members commented that it would be desirable to collect disaggregated data at the post-doc level as well.

The February CEOSE meeting featured a panel discussion on broadening participation, in which several NSF Assistant Directors described the activities of their Directorate. The committee was quite happy with the level of participation. There was also a mini-symposium describing the participation of Native Americans in science activities and a discussion about how to increase their participation in STEM activities. Finally, several other Federal agencies expressed an interest in participation in these activities and share valuable information about how to broaden participation in activities by underrepresented groups. Plans for the next meeting call for a mini-symposium on the participation of women of color in science activities. Women of color face distinct problems that may be different from those faced by all women.

Maldonado described next biennial report that covers the period 2007-2008. The target audience of the report is Congress; the final version is due to be delivered in June. A draft exists, but at this time it cannot be shared broadly. A consultant has been hired to help with putting together the report. Chapter 2 of the draft highlights the activities of the Directorates. The chapter should be carefully reviewed to make sure that the activities of MPS, that has been a leader in reaching out to underrepresented groups, are accurately presented to Congress. Several excellent websites also reflect MPS activities in this area and the consultant should suggest examples of these sites that should be included in the Report.

With respect to the 2008-2014 Strategic Plan for CEOSE, one had to ask what the goals were and how one would know when success had been achieved. Maldonado commented that broadening participation had to be taken seriously, and how was this to be achieved. There was no national plan for broadening participation, but NSF was a leader in this area. Disaggregated data will be very useful to accomplish this goal.

Johnstone recalled that a suggestion had been made that perhaps an MPSAC sub-committee should be established to work with the current MPS broadening participation committee. He asked what would be the focus of such a subcommittee that is not already taken care of by CEOSE itself. The MPSAC is well represented through Dr. Maldonado's CEOSE activities. He asked for suggestions from the committee members.

Neal remarked that data on underrepresented minorities is not readily available at the post-doc level, and that it would be valuable to collect such data. She recommended that data on post-docs be included in the Report to

Congress, when available.

Bortoletto asked if her understanding that the number of NSF grants to African-Americans was down was correct. If so, was this a trend? What is the explanation? Neal replied that this was indeed the case. The number of African-Americans in tenured or tenure track positions was not increasing. Tenured African-American faculty are aging and was not being replaced by younger faculty. Olvera de la Cruz commented that in some programs the low number of faculty of Hispanic and Latin American origin was shocking.

Dr. Suzanne Hawley asked about the status of broadening participation activities, in particular on the competition held by the Committee on the Advancement of Women Chemists. Such activities were extremely successful and important at the University of Washington. Rohlfing responded that a competition was held recently, they are not held every year. She also commented about some other recent activities:

- A workshop on broadening participation was held by CHE, in collaboration with invited Department Chairs last spring. The workshop was very successful, some 15 Dept. Chairs attended.
- A set of slides (about 60-70) were developed by the MPS Broadening Participation group. This set of slides turned out to be a very good resource for broadening participation activities and has been in demand at other institutions.

Johnstone thanked Maldonado for her presentation and work with CEOSE.

Preparation for the Meeting with Dr. Arden Bement, Jr., Director, NSF

Bortoletto suggested starting the discussion by asking about what are the plans to replace Assistant Director Chan, who will be leaving in September. Johnstone said that this should not be the first issue to be discussed; it should be raised towards the end of the meeting. He suggested that the discussion with the Director could start out instead with issues related to the American Recovery and Reinvestment Act (ARRA). The scientific community is very interested in participating but is not sure what are the conditions to do so. Can postdocs be funded? Under what conditions? How to reach out to the science community?

Abruna commented that there has been only a perfunctory posting about the ARRA on the website. What are the plans for using ARRA money? He then commented that clearly energy research was of paramount importance. However, DOE seems to have a hold on energy research, even though DOE support goes mostly towards applied research. How could NSF and DOE bridge the gap on fundamental energy research? Johnstone felt that how energy research is divided between NSF and DOE should be the subject of a separate discussion. A broad discussion about energy research ensued. Abruna said that maybe DOE and NSF could have a joint energy research program. Olvera de la Cruz said that the basic science of energy is not being addressed, that the roughly \$50 million devoted to it is not nearly enough. Peoples said that basic energy research at DOE has grown very substantially. It has nearly doubled, but DOE has many other missions, and basic research was not its primary mission. Kafafi said that DOE has done an excellent job in pointing out what the fundamental problems of energy research were. She said that she would like to see interdisciplinary collaborations within NSF, *e.g.* with social sciences. Such collaborations could help with energy issues. She congratulated DOE for doing a wonderful job. West said that energy science involves many related issues (generation, storage, pollution, consumption, *etc.*) and these should be looked at as an integrated set of problems. NSF could lead the way in creating a framework to understand energy issues. NSF should, however, be careful in getting in bed with DOE to solve isolated problems; it should concentrate on the big picture. Chan pointed out that there have been many discussions on these topics at the highest levels at the NSF. He said that, as everybody knew, the new administration was extremely interested in energy issues, and so was the National Science Board. It was certain that NSF would have energy-related programs. Finally, he pointed out that OSTP was also very interested in this issue and that it was certain to have a role in interagency coordination.

Jorgensen said that it would be helpful to have an overview of NSF's energy related grants, or other energy related portfolio, so one could have a grand picture of current activities. Chan said that such information has been collected on behest of the National Science Board (NSB), but that it has not been analyzed yet. Jorgensen then suggested that it could be helpful to have a presentation of this at the next meeting of the MPSAC.

Johnstone noted that the discussion should return to the agenda to be taken up with the Director. He asked if the MPSAC should ask about the vision about NSF's use of the stimulus money under ARRA. Abruna thought that there should be a question about previously declined proposals. Which of these could be funded?

The MPSAC agreed that the broad agenda should include questions about the NSF vision for ARRA. Several MPSAC members thought that the Director should be asked why NIH allows ARRA funds to be used for supplements of regular grants (it was pointed out that the NIH website says so), whereas NSF doesn't allow supplements. Questions should also be asked about funding of post-docs. Under what circumstances can they be funded? Post-doc retention is a job creation issue. Keyes said that many academics wonder what job creation is in the academic context. Are post-doc positions considered under job creation, given that these are not permanent positions? Or are only tenure-track positions considered as new jobs? Matthews said that it would be worthwhile to ask what the Director's rationale is for spending money?

Johnstone said that asking the Director about the rationale for NSF spending money could be the lead-off question. Cornell said that the message to be conveyed should be that there is a diversity of opinion on this issue among the members of the MPSAC.

Jorgensen commented that it appeared that there were a lot of open positions at the NSF and lots of searches going on. Is this done in an *ad-hoc* fashion, a more formal process is needed. Williams said that he was not sure to what extent this should be discussed. Filling the AD/MPS and DD/AST positions may be quite different. He asked for an explanation of the MPS process for DD/AST. Chan replied that there is a Federal process in place, and that there is no place for a search committee. Aizenman described the process. Williams wanted to know if the fact that so many high level NSF officials (Deputy Director, NSF, Assistant Director and Deputy Assistant Director, MPS, Director, AST) are being searched for is just a statistical fluctuation. He said that he believes that this was the case.

There was further discussion of topics to bring up with the Director, including Cyber Discovery and Innovation (CDI), the Report of the Light Source Panel, diversity issues, energy research, the use of ARRA funds.

Chan then presented themes and initiatives that were likely to form the basis of the FY 2011 budget. He presented viewgraphs related to the new Administration's Science and Technology priorities and areas of emphasis.

Dr. Jean Cottam, Assistant Director for Physical Sciences, Office of Science and Technology Policy (OSTP)

Johnstone introduced Dr. Jean Cottam, Assistant Director for Physical Sciences at OSTP. Cottam began her presentation by noting that OSTP is part of the Executive Office of the President. The President's science advisor, Dr. Holdren, is the Director of OSTP. OSTP gives advice to the President on science policy. OSTP takes a national view; coordinates interagency activities and helps the agencies work together. It also deals with the National Science and Technology Council (NSTC) and the President's Council of Advisors on Science and Technology (PCAST).

The science area of OSTP is staffed by scientists on detail from various agencies. She is in charge of the physics, chemistry, mathematics, and engineering areas and responsible for large parts of MPS, DOE, the National Institute of Science and Technology (NIST), and the science part of the National Aeronautics and Space Administration (NASA). She described the current members of OSTP and asked for suggestions of individuals from NSF who might serve on details at OSTP.

Cottam said that current OSTP science priorities include energy, the environment, and these are linked with STEM education. She believed that basic science research would be seeing dramatic increases. NSF plays a key role in ARRA, and in the administration's priorities. With respect to energy, there was a need for basic research on clean energy and on advanced development techniques. It was important for NSF to define its unique role with respect to energy. NSF's job is to provide OSTP with information to articulate a clear, defensible, and significant role for NSF. Cottam noted that NSF has the ability to fund high risk/ high reward projects since it is not mission oriented like DOE. It is flexible and broadly inclusive. It offers training opportunities and can involve STEM and energy at the same time. The time scale for this activity is the FY 2011

budget. Cottam added that other areas of interest are the environment and climate change and that NSF should be proactive in this area.

In the discussion that followed Cottam commented that she would like to know as quickly as possible what NSF would do in these areas. Finlayson-Pitts commented that she was pleased about the linking of energy and the environment. She said that when considering new sources of energy we should also consider the environmental impact. A question was asked about investments in energy. These take place at DOE, NASA, and other agencies. Would there be a national initiative like the Nanotechnology initiative? The response from Cottam was that the agencies were not quite there yet. Maldonado asked about the process of translating science into technology and Cottam responded that the role of the government is in part to fund basic research. Bortoletto asked about the role of international research. The response was that the global aspect of energy and the environment is essential.

Jorgensen asked about other areas receiving emphasis, such as neuroscience. Cottam replied that important areas were, in addition to health, biomedical research, security and nonproliferation.

Hawley asked about international agreements involving large facilities such as those in AST. She asked if OSTP played a role in coordinating NSF and NASA activities. Cottam replied that this type of coordination goes on every day. When asked if NASA would be considering human travel to Mars she responded that the details of NASA priorities would not be clear until there was a new NASA Administrator.

West asked if OSTP is thinking in a more integrative way about energy and the environment. He pointed out that this is a highly coupled system. The environment and energy are connected to health and the economy, *etc.* The response was that Dr. Holdren was still thinking through all these interdependencies.

Neal asked about education and STEM. Cottam responded that STEM primarily involves K-12 and undergraduates. The nation's population is often unaware of science or frightened by it. The population needs to appreciate it. NSF is involved in graduate education. It trains and performs basic research. Education is a very important part of NSF. NSF needs to highlight the education part of awards and NSF is building the future workforce.

Meeting with NSF Director Dr. Arden Bement, Jr. and NSF Acting Deputy Director Dr. Cora Marrett

Johnstone welcomed Dr. Bement and Dr. Marrett. Dr. Bement expressed his appreciation to the group for their attendance, for supporting MPS, and for carrying on a traditional, important dialog for the Foundation.

Johnstone commented that the first topic of concern for the Advisory Committee was ARRA and related budgets. The Committee wanted to know the rationale behind NSF's choice of mechanisms for spending ARRA funds. Bement responded that NSF's aim was to keep the process simple in order to get the ARRA funds and that NSF was trying to be responsive to the community and pay attention to their needs. He noted that much has been said about other agency plans and that ARRA provides 71 pages of guidelines, which NSF must follow strictly with oversight from OIG. It is important that NSF report back on new technologies, jobs created, *etc.* with the ARRA funds.

With respect to undeclining proposals and proposals still in the merit review stage, NSF had decided to fund the best proposals with Very Good to Excellent ratings that have already undergone merit review; were declined and/or received by NSF on or after October 1, 2008. He noted that NSF had about \$9 billion to spend before the end of the FY 2009 and that existing awards would be supplemented with FY 2009 appropriated funds.

Johnstone raised the concern of the MPSAC for the state of post-doctoral investigators and early career scientists in general. In particular, the MPSAC was concerned with the lack of available academic positions for post-doctoral researchers nearing the end of their terms. Berger noted that headroom has been created with the passing of the ARRA. Bement responded that this issue is ongoing at NSF and has been brought up by senior management and he thought that ARRA and the budget increase should provide some relief with respect to this problem. Marrett noted that Chan has been instrumental concerning the post-doc issue and discussions with university administration have occurred. She said that NSF had looked at activities on this issue at NIH and NSF

needed to plan in concert with others interested in this issue. Bement noted that NSF should plan by meshing ARRA with the FY 2009 and FY 2010 budgets to obviate disruptions in the pipeline that may occur and should look at the total picture. West commented that in the 1970's there were long-term post-doc positions (3-5 years) where funds went directly to the post-docs; it was very successful and led to many successful scientists who are established leading scientists. He asked whether NSF had discussion on this concept as it could alleviate some of the issues. Bement responded that NSF was considering this possibility and that graduate student numbers were expected to swell over the next few years in light of the poor job market/economic situation. NSF was aware that universities are cutting back on hiring new faculty and NSF needed a comprehensive picture of university hiring at this moment across the board. Jorgensen expressed the same concern for post-docs - he believes supplements from ARRA could have helped. He asked about the possibility of summer support for graduate students, at least in the chemistry field. Bement expressed support for supplements through the regular supplement mechanism for both international and summer activities.

Finlayson Pitts was concerned that NSF might experience what she expressed as the "NIH effect" but felt that staggering awards in 3-5 year intervals may alleviate negative effects in the future. Cornell said that the problems that occurred at the National Institutes of Health (NIH) could be avoided if budgets remain high or even increase. NSF needs to keep an eye on grant size and seek ways to increase average grant size and perhaps look at successful CAREER awardees and reward them with special incentives/funds, *etc.* Bement responded that NSF was trying to increase grant size - in the past the average award size was approximately \$120,000 per year and it was now at about \$150 per year with expectations of increasing that even more

Discussion then turned to priorities for the new administration for NSF, and especially MPS. Johnstone commented on the talk delivered earlier in the day by Cottam. It had been very helpful with respect to Administration priorities such as energy, environment, education, *etc.* He asked what NSF's role would be in constructing an energy agenda. Bement responded that NSF already had one. NSF will place more emphasis on basic research at the frontier, high-risk/high-impact/high-reward work, multidisciplinary research and graduate research fellowships. NSF has small, focused renewable energy work around fuel cells, conservation, chemical conversion, *etc.* Also, many former/present NSF investigators now receive support from DOE and NSF-supported work is moving more in the energy direction. NSF wants to look at higher levels of complexity to understand relationships between energy and environment and view matters as a coupled system. With respect to climate change NSF has been leading in this area for quite some time. NSF has improved the infrastructure for improved modeling, and there is now a better understanding of the carbon cycle and more information on how to sequester carbon. NSF-supported areas of research include monitoring, observational science such as sensor arrays (*e.g.* EarthScope). Such systems create huge volumes of valuable data that in turn validate various scenarios to inform policymakers. Also, there is a convergence of the biological and natural sciences along with the social, geophysical, and engineering sciences. No other agencies are engaged in this manner across multiple areas. Marrett noted that NSF was having discussions with the head of OSTP on how to collaborate on these larger issues such as energy.

With respect to MPS opportunities on climate, Finlayson-Pitts noted the tremendous opportunities that were available here. She gave the example of particles/particle formation and how they interact with light, *etc.* and noted that one does not have sophisticated techniques to get that data and the few techniques that are available are limited. There are vast opportunities for chemistry to look at particle formation, interactions, clustering, and nucleation. Bement noted the difficulty in modeling rainfall and climate change. The variability of greenhouse gases needs more research and there are many grand challenges that will require a multidisciplinary approach. Berger mentioned the large volumes of data being generated on climate/systems/observations and that systems and models have to be brought together. This is an opportunity area for MPS.

West commented that he thought NSF might be more powerful than DOE in energy-related science. NSF has a great opportunity to reframe the scientific paradigm concerning highly coupled systems, but in his opinion, panels tend to 'deconstruct' interdisciplinary proposals back down to respective subject areas. There should be more emphasis on collaborations of all sorts and more speculative, high-risk proposals do not review well. The need for more of these types of proposals does not translate down to the trenches. Bement commented that the ARRA stimulus money will provide an opportunity to provide incentives for high-risk/high-reward research but one needed buy-in from program directors. Marrett also emphasized the need to have buy-in from the

community. West added that NSF needed new mechanisms to review and support new, broad-based grand challenge proposals.

The conversation then turned to the interdisciplinary research/education interface. Neal asked how NSF might promote education such that people self-organize better around holistic complex science. Marrett replied that NSF does it somewhat already -- trying to bring people together to come up with the best ideas and best practices, but NSF does not have a magic answer. Bement added that NSF is different from other research councils/organizations because it seeks to integrate research with education.

With respect to diversity Olvera de la Cruz noted that the pipeline loses students at the Ph.D. level and as assistant professors and asked how ARRA funds could be used to help maintain diversity. Bement responded that programs like LSAMP have been successful for this purpose. An ever-present barrier for STEM diversity is the lack of preparation of students before their junior year of undergraduate education as well as poor math skills prior to entry to their first year of college. The community needs to emphasize the interface between secondary/undergraduate and community college/4-year university levels. There is still too much waste at these interfaces and we lose students who have the intellectual capability but not the preparation.

David Keyes opened discussion on the MPS Strategic Coinvestment Initiative (SCI) and noted that this year represents a time to make very important strategic investments, such as, for example, the SOLAR joint program. He was interested in feedback on the SCI model as a vehicle to move into strategic areas and was wondering how useful it is. Bement responded that while it was necessary now it would not be needed indefinitely as each division has its own needs and priorities. At present facilities are costing large sums of money, particularly for operations costs.

On MPS personnel issues, Williams noted that the Astronomy Division Director position has been vacant for approximately one year and the search had not been successful. A large fraction of the AST portfolio involves large projects and the AST community is very concerned. Bement asked Chan about the status of the AST Division Director search and Chan responded that the search had to be reopened. Williams asked about the number of NSF staff in 'acting' capacities and Bement commented that it is NSF's responsibility to get the best talent, which involves understanding from the community that they are needed; perhaps people in the community, especially mid-career people with tenure could serve in some of the positions. Williams then asked about filling Dr. Chan's position and Bement replied that the MPSAC was the best place to obtain names for the MPS Assistant Director position. He said that NSF will need to canvas the community broadly and added that during the previous search that led to Dr. Chan's placement, there had been between 60-70 nominees, and this was eventually narrowed to 6 or 7 names. These individuals had been brought to NSF, where NSF had discussed their vision and plans with the NSF senior management. These were confidential discussions and after these final interviews NSF had made the selection. He hoped that the timeline for the search for Chan's replacement would be fairly swift but that NSF might need someone to serve in an 'acting' capacity if timing is an issue such as, for example, the academic calendar.

Johnstone commended Chan on behalf of the MPSAC and noted MPSAC's appreciation of Chan's commitment to transparency in working with the MPSAC. Bement also thanked Chan for his service and noted that a number of partnerships have been started under Dr. Chan's leadership and guidance.

Johnstone thanked Bement and Marrett for taking time in their very busy schedules for meeting with the MPSAC.

Other Business

Robertson commented that it would be interesting to see how NSF can help with maintaining diversity in academia during these tough economic times. He felt that should think outside of the box on this topic. Chan remarked that things would need to be done at the divisional level at this stage rather than NSF-wide. Bortoletto wondered if NSF has played a role in curriculum change to help with interdisciplinary research, and added that DMR has addressed this issue with a workshop. Robertson noted that a broad range of experts were brought in to provide input on materials science and engineering education, in particular curriculum development. March commented that NSF wants to communicate to the community that new ideas are welcome. West said that with

respect to the use of ARRA funds he needed clarification on how supplements could be awarded. March felt that supplements for FY09 should be limited -- if everyone came in with a supplement request, the divisions could not handle it. Olvera de la Cruz wondered if the MPSAC could make something happen around broadening participation and Aizenman responded that there have been several accomplishments as a result of the MPSAC discussions, citing the CHE Gender and Diversity Workshops, and other similar events. It takes times for the impact of these workshops to be seen, but the workshops do have impact.

Chan discussed the process of finding new MPSAC members, and noted that the process should be open; past and present MPSAC members along with MPS Divisions should offer input. There is no formal mechanism to nominate potential AC members but AC membership is highly scrutinized by various NSF stakeholders. Diversity (geographic, institutional, ethnic, gender) must be considered and the MPSAC should consider non-traditional areas such as the public and private section in order to help bridge key MPS areas such as the health and environmental fields. For example, the Office of Cyberinfrastructure's advisory committee has senior level Microsoft and Google employees on their committee. He asked that MPSAC members send suggestions for new AC members by June 1.

Johnstone invited MPS-AC committee members whose terms were expiring on October 1, 2009) to make comments. Keyes felt that participating on the MPSAC had been a truly stimulating experience and that it was unique in the sense that there few other venues where one could connect with others outside of one's own field. It had been a very rewarding experience. Maldonado commented that the time on the MPSAC had gone by very quickly and she was very impressed with the MPS Directorate and noted that there was a lot of overlap with the engineering directorate. McDuff commented that the experience had been worthwhile and she had enjoyed being a member of the MPSAC. Robertson noted that had been a pleasure to serve for three years and to have met colleagues in the MPS disciplines. Williams said that it had been a pleasure to work with Chan, that the MPSAC and that the MPSAC needed hard hitting-answers to its questions, and concluded with the quote "Do not go gentle into the night..."

Johnstone thanked members of the MPSAC and MPS staff for their participation in the meeting.

Adjournment

The meeting was adjourned at 1:30 PM.

APPENDIX I

ATTENDEES

MPSAC Members Present at NSF

Hector D. Abruna, Cornell University
James Berger, Duke University
Daniela Bortoletto, Purdue University
Eric Cornell, JILA and the University of Colorado
Barbara J. Finlayson-Pitts, University of California, Irvine
Irene Fonseca, Carnegie Mellon University
Suzanne Hawley, University of Washington
Iain M. Johnstone, Stanford University
William L. Jorgensen, Yale University
David E. Keyes, Columbia University
Theresa A. Maldonado, Texas A&M University
Dennis L. Matthews, University of California, Davis
Dusa M. McDuff, SUNY-Stony Brook
Ramesh Narayan, Harvard-Smithsonian Center for Astrophysics and Harvard University
Sharon L. Neal, University of Delaware
Monica Olvera de la Cruz, Northwestern University
John Peoples, Jr. Fermilab
Ian M. Robertson, University of Illinois at Urbana-Champaign
Joel E. Tohline, Louisiana State University
Robert Williams, Space Telescope Science Institute (by telephone)
Geoffrey West, Santa Fe Institute

MPSAC Members Absent

Winston Soboyejo, Princeton University

MPS Staff

Morris Aizenman, Senior Science Associate, MPS
Tony Chan, Assistant Director, MPS
Denise Caldwell, Deputy Division Director, Division of Physics
Joseph Dehmer, Director, Division of Physics
Luis Echegoyen, Director, Division of Chemistry
Craig Foltz, Acting Director, Division of Astronomical Sciences
Eileen Friel, Executive Officer, Division of Astronomical Sciences
Susan Hamm, Staff Associate for Budget, MPS
Janice Hicks, Executive Officer, Division of Chemistry
Carmen Huber, Acting Executive Officer, Division of Materials Research
Zakia Kafafi, Director, Division of Materials Research
Deborah Lockhart, Executive Officer, Division of Mathematical Sciences
Peter March, Director, Division of Mathematical Sciences
Celeste Rohlfing, Head, Office of Integrative Activities
G. Wayne van Citters, Jr., Senior Advisor, Facilities, MPS (present via phone)

Visitors

Arden Bement, Jr., Director, NSF
Jean Cottam, Assistant Director for Physical Sciences, Office of Science and Technology Planning (OSTP)
Cora Marrett, Acting Deputy Director, NSF
James Murday an, former Program Officer, Office of Naval Research (ONR)
Edward Seidel, Director, Office of Cyberinfrastructure, NSF
Sidney Wolff, President of the Large Synoptic Survey Telescope Corporation (teleconference)

**APPENDIX II
BREAKOUT SESSION ROOMS
MPS Advisory Committee Meeting
November 6, 2008**

		DIVISIONAL ASSIGNMENTS FOR MPSAC MEMBERS						
		AST	PHY	CHE	DMR	DMS		
		Room	Room	Room	Room	Room		
		365	273	II - 525	II - 535	II - 545		
Term Ends 09/30/09								
	JOHNSTONE					X		
	JORGENSEN			R				
	KEYES					R		
	MALDONADO				X			
	MCDUFF					X		
	OLVERA				R			
	ROBERTSON				X			
A	SOBOYEJO							
	WILLIAMS	R						
Term Ends 09/30/10								
	ABRUNA			X				
	CORNELL		R					
	MATTHEWS		X					
	TOHLINE	X						
Term Ends 09/30/11								
	BERGER					X		
	BORTOLETTO		X					
	FINLAYSON-PITTS			X				
	FONSECA					X		
	HAWLEY	X						
	NARAYAN	X						
	NEAL			X				
	PEOPLES	X						
	REICHMANIS				X			
	WEST		X					
Except for AST and CHE all breakout sessions will be held in Stafford II building								
TC	Teleconference							
A	Absent							
R	Breakout CHAIR, MPSAC member who will summarize Divisional meetings activities to MPSAC							

APPENDIX III

REPORT OF THE PHYSICS COMMITTEE OF VISITORS

The report and the MPS response to the report are available at

<http://nsf.gov/mps/advisory/cov.jsp>

APPENDIX IV

August 19, 2009

Dr. Tony F. Chan,
Assistant Director
Directorate for Mathematical and Physical Sciences
National Science Foundation
4201 Wilson Boulevard
Arlington, VA 22230

Dear Dr. Chan:

I have reviewed the final version of the minutes of the Directorate for Mathematical and Physical Sciences Advisory Committee meeting that was held April 2-3, 2009 (attached), and am pleased to certify the accuracy of these minutes. Morris Aizenman has done an excellent job in recording the most significant parts of the discussion.

Sincerely,

Signed

Iain Johnstone
Chair, Mathematical and Physical Sciences Advisory Committee