



INSTITUTE FOR  
WOMEN'S POLICY RESEARCH

# Accelerating Change for Women Faculty of Color in STEM: Policy, Action, and Collaboration

MAY 2013 CONVENING

*A summary of findings and recommendations*

## About This Report

This report is part of a project to address the underrepresentation of women faculty of color in science, technology, engineering, and mathematics (STEM) led by the Institute for Women's Policy Research (IWPR). It summarizes highlights from a convening held in May 2013 that brought together nearly 50 experts, including professors, academic administrators, and representatives of government, professional societies, the corporate sector, and women's organizations. It addresses the barriers that make it difficult for women faculty of color to advance in STEM fields, key programmatic and policy shifts that would promote their success, and strategies for implementing promising changes and taking them to scale. The convening and report are part of IWPR's research on education and training, which includes early care and education, girls' experiences in the K-12 system, postsecondary attainment, and high-quality workforce development opportunities for STEM and other careers. IWPR's recent research in this area includes a profile of programs at community colleges designed to engage women in STEM fields, as well as reports exploring pedagogical methods to increase women's participation in engineering.

## About the Institute for Women's Policy Research

The Institute for Women's Policy Research (IWPR) conducts rigorous research and disseminates its findings to address the needs of women, promote public dialogue, and strengthen families, communities, and societies. IWPR works with policymakers, scholars, and public interest groups to design, execute, and disseminate research that illuminates economic and social policy issues affecting women and their families, and to build a network of individuals and organizations that conduct and use women-oriented policy research. The Institute's work is supported by foundation grants, government grants and contracts, donations from individuals, and contributions from organizations and corporations. IWPR is a 501(c)(3) tax-exempt organization that also works in affiliation with the women's studies and public policy and public administration programs at The George Washington University.

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*A summary of findings and recommendations*

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# Executive Summary

Women of color are significantly underrepresented in science, technology, engineering, and mathematics (STEM) disciplines, particularly in the professoriate. They constitute 5.7 percent of those with STEM doctorates who are assistant, associate, or full professors at four-year colleges, universities, and affiliated centers and institutes in the United States but make up 15 percent of the population among working-age adults (25–64 years). Only 6,400 women of color with STEM doctorates hold assistant, associate, or full professorships, compared with 19,800 white women, 20,500 men of color, and 65,100 white men. Representation in the STEM professoriate is lowest among black, Hispanic, and Native American women, and these groups tend to be especially underrepresented in specific disciplines, such as computer and mathematical sciences.

In addition, many women of color who serve in entry level faculty positions do not advance through the ranks. The proportion of faculty positions held by underrepresented minority women with STEM doctorates decreases with each step up the ladder: in the United States, underrepresented minority women are 3.2 percent of assistant professors at four-year colleges, universities, and affiliated centers and institutes, 2.9 percent of associate professors, and 1.0 percent of full professors. Among Asian American women—who are the best represented minority female group at each level of the STEM professoriate—the same pattern holds true. Asian American women hold 7.0 percent of assistant professorships, 4.2 percent of associate professorships, and 1.5 percent of full professorships.

Expanding opportunities for women of color to pursue and succeed in academic STEM careers is essential for improving labor market outcomes and advancing the nation's global leadership in STEM. The underrepresentation and limited advancement of women of color on STEM faculties negatively affects the scientific community and nation as a whole. When the entire STEM talent pool is not tapped, the scientific community and nation do not fully benefit from the innovations, discoveries, breadth of knowledge, and experiences that a more diverse STEM workforce can bring.



This report summarizes findings and recommendations from a convening, “Accelerating Change for Women Faculty of Color in STEM: Policy, Action, and Collaboration,” that was designed to address the underrepresentation of women of color in STEM academic careers. Organized by the Institute for Women’s Policy Research and held in May 2013, the convening provided an opportunity for individuals who work in various sectors—including academia, government, corporations, and nonprofits—to share their experiences and knowledge about conditions for women of color in academic STEM careers and approaches that can facilitate their success and continued advancement. Speakers and participants addressed a range of topics, including current data illuminating the status of women of color in STEM, areas where progress has been made and places where it has stalled, and current initiatives to increase the representation of women of color in STEM faculty positions. They also discussed key areas of potential change (e.g., policy, institutions, and philanthropy) and actions that need to be taken within each area.

Throughout the convening, presenters and participants emphasized that multiple factors hinder progress for women faculty of color in STEM. These factors include workplace climate issues, such as “microaggressions” and “incivilities” (statements that unintentionally send demeaning messages to people of color), as well as the need for more academic departments to adopt a multicultural perspective that would acknowledge racial/ethnic differences and embrace diversity. In addressing workplace climate issues, one presenter spoke about what she calls the “pet to threat” phenomenon, in which women faculty of color often move from being seen as a novelty and asset (“pet”) because of the diversity they bring, to being seen, as they ascend through the ranks, as a challenge to the status quo (“threat”).

STEM women faculty of color face many of the same challenges that affect women of color in our society more broadly. One presenter noted that women of color, including those with doctorates, often experience social challenges, health disparities, and family responsibilities that make it difficult to succeed without policies that help them balance the demands of their careers with other obligations. For instance, black and Hispanic women who are employed as scientists and engineers are less likely than their white counterparts to be married and to enjoy the economic benefits of two incomes. Yet, many women of color in STEM, as in the general population, have the responsibility of caring for children or other family members. Women of color also experience gender and racial wealth gaps that may make it difficult for them to succeed in academic STEM careers, especially if institutional resources to support their work are limited. In addition, black and Hispanic women in STEM are not precluded from health conditions that disproportionately burden these racial/ethnic groups in the general population. While the National Science Foundation has recently recognized, through its Career-Life Balance initiative, the importance of work-life balance policies in helping scientists and engineers to address such challenges, more needs to be done to implement these policies and understand their importance for women faculty of color in particular.

High community service demands, insufficient social support, and ongoing discrimination also contribute to the slow nature of progress for women faculty of color in STEM. Presenters noted that many women faculty of color face high demands to perform volunteer activities such as mentoring undergraduate students of color and serving on committees and national boards—activities that institutions

often do not value or reward when making decisions about tenure and promotion. Women of color may also have more limited access to mentoring and social support networks than white women and men, which can hinder their career advancement. In addition, women faculty of color in STEM disciplines continue to face discrimination and bias that manifests itself in various ways.

A number of approaches to improving conditions for women of color on STEM faculties have been implemented and have made a difference, but promising strategies need to become more widespread. Participants discussed the need for new and expanded program initiatives, more convening opportunities that enable women of color to share experiences and knowledge and to develop ongoing networks of support, and additional research to evaluate program effectiveness, increase institutional transparency, and better illuminate the underlying causes of slow progress. They also suggested there is a need to expand mentoring opportunities for women faculty of color in STEM, strengthen efforts to combat the social isolation of women faculty members of color, and increase cross-institutional collaborations among professional societies, national nonprofit organizations, governmental organizations, and universities.

The report concludes by summarizing recommendations for advocates, funders, and institutions to improve the status of women faculty of color in STEM. These recommendations include:

## Advocacy Recommendations

- Increase access to information and raise awareness about the status of women faculty of color in STEM, through resources such as a web portal that provides data on women of color in STEM, online tools that enable users to generate data tables, and information about scholarships or fellowships available to women faculty of color.
- Develop a national standard for valuing the volunteer and service work that many faculty members perform so the full range and quantity of their service activities are factored into decisions about tenure and promotion.
- Develop metrics for monitoring and publicizing individual institutions' progress on diversity in STEM, such as a scorecard system that tracks and reports institutions' performance and the gender and racial/ethnic diversity of their STEM faculty.

## Recommendations for Improving Funding Opportunities

- Structure funding opportunities to increase the visibility and prestige of women faculty of color, such as through grant programs for junior women faculty of color that help to ensure that their scientific contributions receive recognition and open up new sources of support.
- Create programs that directly support women faculty of color in STEM and help them to build assets over time by offering assistance with expenses such as



student loan payments or down payments for a mortgage, or by providing targeted research and academic supports.

- Provide greater transparency about the gender and racial/ethnic backgrounds of those who apply for and receive federal grants.

## Recommendations for Improving Institutional Practices

- Develop institutional leadership that values diversity, in part through hiring policies requiring potential employees to demonstrate cultural competence and a commitment to diversity.
- Require diverse search committees for new faculty hires.
- Improve the academic work climate for women faculty of color in STEM by implementing initiatives such as offering more sabbaticals targeted for women of color in STEM, strengthening policies that support career-life balance, and educating tenure and promotion committees about the specific challenges that women faculty of color often face.
- Encourage institutions to implement “contextualized” mentoring plans that acknowledge common barriers and inequities affecting women of color in STEM and that include tools and processes for mentor training and evaluation.
- Implement regular, transparent salary reviews.

The report discusses these recommendations in more detail and summarizes action steps for implementation. Through more concerted, focused, and widespread efforts to accelerate progress for women faculty of color, the nation as a whole will advance its global leadership in STEM.



# Introduction

Women of color have made inroads into science, technology, engineering, and mathematics (STEM) disciplines over the last several decades but continue to be underrepresented among those holding university positions in these fields.<sup>1,2</sup> In 2010, women of color were only 5.7 percent (6,400 of 111,800) of those who held doctorates in all STEM fields and were employed as assistant, associate, or full professors at four-year colleges, universities, and affiliated centers and institutes,<sup>3</sup> while their representation in the U.S. population (aged 25–64) was 15 percent.<sup>4</sup> Underrepresented minority women (blacks, Hispanics, Native Americans, and those who report more than one race) have especially low levels of representation in the STEM professoriate: they hold just 2.1 percent of faculty positions in these disciplines despite constituting 13 percent of the U.S. working-age population.<sup>5</sup> While their representation remains quite low in all STEM fields, it varies somewhat across disciplines. The highest level of representation for underrepresented minority women faculty is in the biological, agricultural, and other life sciences, and the lowest is in computer and mathematical sciences (Appendix Table A1).

Better representation of women of color on STEM faculties would have a positive impact on the scientific community and the nation as a whole. It would allow STEM communities to fully benefit from the innovations and insights that a more diverse STEM workforce can offer and increase the number of role models available to inspire the next generation. Recognizing the critical importance of tapping the full STEM

<sup>1</sup> There is some debate about what constitutes “STEM” (Beede et al. 2011). A narrow definition includes the traditional STEM fields of mathematics and computer sciences; engineering; the biological, agricultural, and other life sciences; and the physical and geosciences. Broader definitions may also include the social sciences. This report focuses on the traditional STEM fields, since (with the exception of the biological and life sciences) women and people of color are less well-represented in these fields than in the social sciences (Committee on Equal Opportunities in Science and Engineering 2011).

<sup>2</sup> “Women of color” here includes Asian American, black or African American, Hispanic, Native Hawaiian/Pacific Islander, American Indian/Alaska Native (Native American) women, and those who report more than one racial category.

<sup>3</sup> IWPR calculations (see Figure 2) based on special tabulations of data from the National Center for Science and Engineering Statistics’ Survey of Doctorate Recipients provided by the National Science Foundation (NSF). Figures include only those who are U.S. citizens or permanent residents.

<sup>4</sup> IWPR analysis of the Integrated Public Use Microdata Series (IPUMS) version of the 2011 American Community Survey (Ruggles et al. 2010). Data are for the citizen population.

<sup>5</sup> IWPR calculations based on 2011 IPUMS American Community Survey microdata (Ruggles et al. 2010) and special tabulations of data from the National Center for Science and Engineering Statistics’ 2010 Survey of Doctorate Recipients provided by the National Science Foundation.

talent pool, many scholars, program leaders, policymakers, and others have recently called for new and expanded strategies that enable women of color to move into and advance in STEM faculty positions. Programs and policies designed to increase the representation of women faculty of color in STEM disciplines have been implemented at some U.S. colleges and universities, but the slow rate of progress for women of color in these fields reveals a need for further discussion and change. While women faculty overall are underrepresented in STEM compared with men, women faculty of color face specific challenges that require distinct focus to enact change.

## Convening Overview

In May 2013, the Institute for Women's Policy Research (IWPR), with support from the National Science Foundation (NSF) ADVANCE program, held a convening, "Accelerating Change for Women Faculty of Color in STEM: Action, Policy, and Collaboration." The central goals of the convening were to: (1) identify promising policy and programmatic changes for increasing the representation and success of women faculty of color in STEM; (2) define areas for action for different sectors invested in accelerating the progress of STEM women faculty of color; and (3) develop new relationships among those committed to the advancement of women of color in STEM academic careers. Planned with a distinguished advisory committee (Appendix B), the convening brought together approximately 50 experts to discuss the causes of slow progress in integrating women faculty of color in STEM and promising approaches to advance their careers. Participants included faculty, college and university administrators, and representatives from government, corporations, professional societies, and women's organizations (Appendix C).

The meeting included presentations and discussions designed to illuminate the current state of knowledge about women faculty of color in STEM and generate new ideas about strategies for increasing their representation and furthering their career advancement. In the first session, speakers presented data on where progress has been made for women faculty of color in STEM, as well as where and why it has stalled. A second session addressed the need for cross-institutional partnerships and lessons learned about promising practices for increasing the representation and success of women faculty of color in STEM. The luncheon keynote speaker focused on the White House's current initiatives to remove barriers faced by women and girls in STEM education. Immediately after this presentation, panelists in an early afternoon session provided policy recommendations at the federal, institutional, and departmental levels and discussed how the socio-economic and health status of women of color shapes the experiences of women faculty of color in STEM. During the final session of the day, participants identified and prioritized ideas for policy and program changes and developed action plans in small groups for each of the top five ideas (for a complete agenda, see Appendix D).

The convening built on previous discussions on increasing the representation of women of color in STEM. In particular, the 2009 Mini-Symposium on Women of Color in Science, Technology, Engineering, and Mathematics held in Arlington, Virginia, and organized by the Education Research Collaborative at TERC laid the groundwork for this event.<sup>6</sup> The recommendations that emerged from the 2009 Mini-

<sup>6</sup> For a summary of this event and its findings, see Ong 2010.

Symposium helped to shape the agenda for “Accelerating Change” and provided a starting point for reflection on potential areas for further intervention. While the Mini-Symposium and other events have identified many barriers to progress and led to important outcomes, the continued slow rate of improvement indicated a need for further discussion, analysis, and action.<sup>7</sup> “Accelerating Change” provided a forum for identifying further steps toward progress, with a particular focus on the professoriate and on collaboration to speed the pace of change.

## Background: The Need to Accelerate Change for Women Faculty of Color in STEM

Since the publication of “The Double Bind” nearly four decades ago (Malcom, Quick Hall, and Welsh Brown 1976), women of color have made progress in STEM fields, especially at the undergraduate and graduate levels, but they have a long way to go toward proportional representation. In 2011, women of color earned 12 percent of STEM bachelor’s degrees (or 31,125 degrees) that were awarded at U.S. higher education institutions, compared with 7.4 percent in 1991 (Figure 1; Appendix Figure 1).<sup>8</sup> At the master’s level, the share of women of color earning STEM degrees increased from 4.9 percent in 1991 to 10 percent (5,754 degrees) in 2011. In both 1991 and 2011, women of color earned a much smaller share of STEM doctoral degrees than bachelor’s or master’s degrees, despite progress at this highest degree level: women of color earned 9.0 percent of all doctoral degrees (1,323 degrees) in STEM fields in 2011, compared with just 3.0 percent in 1991 (Figure 1; Appendix Figure 1). In addition, in 2010 there were over three times more men of color with STEM doctorates than women of color employed as assistant, associate, or full professors, as well as three times more white men than white women and three times more men than women overall (Figure 2; Appendix Figure 2).

While the data overall show progress for women of color in STEM over the last two decades, the greatest advances took place between 1991 and 2001. In 2001 and 2011, the proportion of bachelor’s and master’s degrees awarded to women of color were virtually the same, while the proportion of doctorates received by women of color increased slightly (from 6.8 percent to 9.0 percent; Figure 1 and Appendix Figure A1). During this decade, however, the share of women of color in the working-age U.S. citizen population (25–64 years) also increased by two percentage points (from 13 percent in 2000 to 15 percent in 2011), indicating that women of color made little progress at the highest degree level relative to their growth in the overall population and actually experienced a decline at the bachelor’s and master’s degree levels; as their proportion of the population increased, their share of degrees awarded at these levels remained essentially the same. Non-Hispanic white women, too, experienced little progress in STEM between 2001 and 2011: their proportion of the working-age citizen population decreased from 38 percent in 2001 to 36 percent

**Since the publication of “The Double Bind” nearly four decades ago, women of color have made progress in STEM fields, especially at the undergraduate and graduate levels, but they have a long way to go toward proportional representation.**

<sup>7</sup> Another previous event, “Enhancing Diversity in Science: Working Together to Develop Common Data, Measures, and Standards,” provided recommendations that are compatible with those proposed by “Accelerating Change” participants. A summary of the workshop is available at <[http://www.cossa.org/diversity/reports/Enhancing\\_Diversity\\_in\\_Science\\_Common\\_Data\\_Measures\\_and\\_Standards.pdf](http://www.cossa.org/diversity/reports/Enhancing_Diversity_in_Science_Common_Data_Measures_and_Standards.pdf)> (accessed November 6, 2013).

<sup>8</sup> “Women of color” here does not include those who identify with two or more races/ethnicities, since prior to 2008 the survey did not collect information on this category.

**In 2010 there were over three times more men of color than women of color with STEM doctorates employed as assistant, associate, or full professors, as well as three times more white men than white women and three times more men than women overall.**

in 2011, while their share of bachelor's and master's degrees awarded also decreased two percentage points each. Only at the highest degree level did white women advance: their share of doctorate degrees awarded increased from 23 percent to 25 percent between 2001 and 2011, while their proportion of the population slightly declined (Figure 1 and Appendix Figure A1).<sup>9</sup>

Among women, representation levels in STEM disciplines vary considerably by race and ethnicity. In 2011, black women had the lowest representation overall as degree holders in STEM fields; their representation gap—the increase needed to achieve full STEM representation in relation to their representation in the total population—was 54 percent for bachelor's degrees, 61 percent for master's degrees (equal to the representation gap of Native Americans), and 71 percent for doctorate degrees (Appendix Figure A3). Asian American women were the most highly represented, with more Asian American women receiving STEM degrees than would be predicted by their overall representation in the population. While men were better represented than women in every racial and ethnic group, the patterns of difference in representation were comparable to those seen among women. Asian American men were the most highly represented group, and black men had the lowest levels of representation relative to their overall representation in the population (Appendix Figure A4).

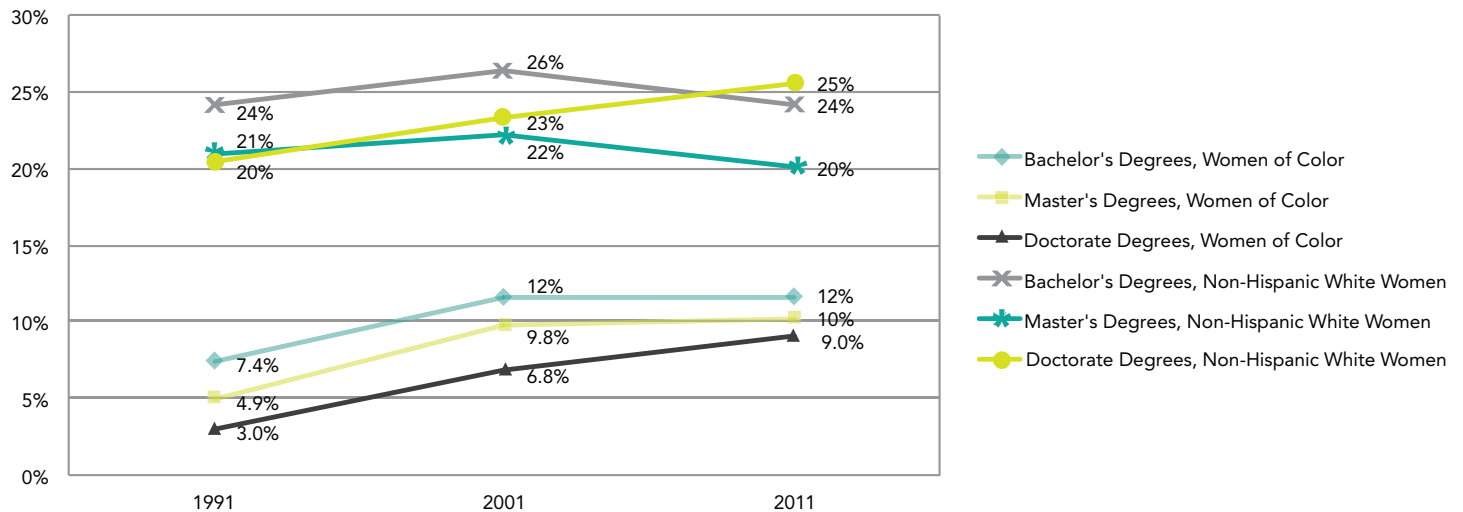
The representation of women of color in STEM also varies substantially across disciplines. While the numbers of degrees women of color have received in STEM overall has continued to increase in recent years, these gains are not equally distributed across STEM fields. For example, the number of doctoral degrees earned by women of color in the biological sciences in 2011 (677) was nearly five times the number earned in 1991 (143) and more than twice the number earned in 2001 (328).<sup>10</sup> The number of doctoral degrees earned by women of color in mathematics and statistics during this time period grew much more slowly. In 1991, women of color earned 21 doctoral degrees in this field, only slightly less than the number earned in 2001 (24). By 2011, the number of mathematics and statistics doctorates earned by women of color (56) had increased more substantially but still remained less than three times the number in 1991.<sup>11</sup>

<sup>9</sup> In 1990, women of color comprised 10 percent of the U.S. citizen population and non-Hispanic white women were 41 percent. Population data for 1990 and 2000 are based on IWPR calculations of U.S. Decennial Census (5 percent sample) data. Data for 2011 are based on IWPR analysis of 2011 IPUMS American Community Survey microdata (Ruggles et al. 2010). Population data for permanent residents are not available.

<sup>10</sup> Prior to 2008, NCES used two doctoral degree categories: doctor's and first-professional. In 2008 NCES introduced three new doctoral degree categories: doctor's research/scholarship, doctor's-professional practice, and doctor's-other. NCES allowed for optional reporting in these categories in 2008 and 2009 and required institutions to use only these three new categories as of 2010. In Figure 1, data for 1991 and 2001 include doctor's degrees; data for 2011 include doctorates categorized as doctor's-research/scholarship.

<sup>11</sup> IWPR analysis of data from the IPEDS Completions Survey by Race (U.S. Department of Education 2013).

**Figure 1 / Percent of All STEM Degrees Awarded to Women of Color and White Women by Degree in 1991, 2001, and 2011**



Notes: STEM here includes the agricultural sciences; biological sciences; computer sciences; atmospheric sciences, earth sciences, and oceanography; mathematics and statistics; physical sciences; and engineering. "Women of color" refers to those who identify as black (non-Hispanic), Hispanic, Asian American or Pacific Islander, and American Indian/Alaska Native. Figures include only those who are U.S. citizens and permanent residents.

Source: IWPR analysis of data from the IPEDS Completions Survey by Race (U.S. Department of Education 2013).

The slow rate of improvement for women of color in STEM also affects those in the professoriate. In 1993, women of color constituted approximately two percent of those who held doctorates in STEM fields and were employed as assistant, associate, or full professors at four-year colleges, universities, and affiliated centers and institutes (Appendix Table A1), while their share of the working-age U.S. citizen population in 1990 was 10 percent.<sup>12</sup> By 2010, the share of faculty positions that women of color held in relation to their proportion of the total population had increased, but only slightly: women of color were 5.7 percent (6,400 of 111,800) of those who held doctorates in STEM fields and were employed as assistant, associate, or full professors (Figure 2),<sup>13</sup> and they were 15 percent of the total U.S. citizen population aged 25–64.<sup>14</sup> Among women of color, Asian Americans are the largest group in the STEM professoriate: in 2010, they were 3.7 percent of assistant, associate, and full professors, while underrepresented minority women were just 2.1 percent (Appendix Table A1).

Non-Hispanic white women are also underrepresented among those holding STEM doctorates and employed as faculty members relative to their share of the population, although to a lesser degree than many women of color. In 2010, non-

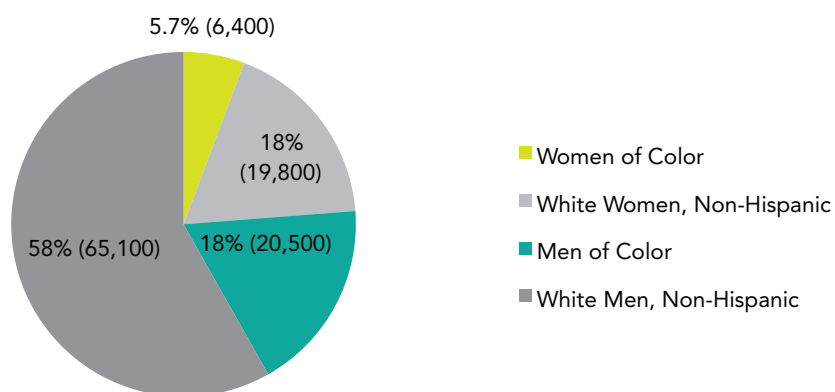
<sup>12</sup> IWPR calculations of U.S. Decennial Census (5 percent sample) data.

<sup>13</sup> Comparable data on the professoriate for 1991 are not available. Figures on STEM faculty include only citizens and permanent residents.

<sup>14</sup> IWPR analysis of 2011 IPUMS American Community Survey microdata (Ruggles et al. 2010). Data on the demographic makeup of the permanent resident population are not available.



**Figure 2 / Number and Proportion of Persons with STEM Doctorates Employed as Faculty at Four-Year Colleges, Universities, and Affiliated Centers and Institutes, by Gender and Race/Ethnicity, 2010**



Notes: STEM fields include the biological, agricultural, and other life sciences; computer and mathematical sciences; physical and related sciences; and engineering. “Women of color” refers to those who identify as black, Hispanic, Asian American, American Indian/Alaska Native, Native Hawaiian/Pacific Islander, and those who report more than one racial category. Figures include faculty at four-year colleges or universities, medical schools (including university-affiliated hospitals or medical centers), and university-affiliated research institutes who are U.S. citizens or permanent residents who hold the position of assistant, associate, or full professor.

Source: IWPR compilation of special tabulations of data from the National Center for Science and Engineering Statistics’ 2010 Survey of Doctorate Recipients provided by the National Science Foundation.

Hispanic white women held 18 percent of STEM assistant, associate, and full professorships at four-year colleges, universities, and affiliated centers and institutes (Figure 2 and Appendix Table A1) and were approximately 36 percent of the U.S. citizen population age 25–64 years. In contrast, non-Hispanic white men with STEM doctorates were significantly overrepresented on STEM faculties: they held 58 percent of these positions but constituted only 35 percent of the working-age U.S. citizen population. The percentage of men of color with STEM doctorates who held STEM assistant, associate, and full professorships (18 percent; Figure 2 and Appendix Table A1) was somewhat higher than their proportion of the working-age citizen population (14 percent).<sup>15</sup>

Among women (and men) overall, representation in the STEM professoriate varies considerably across disciplines (Appendix Table A1). Women as a whole have the highest representation in the biological and life sciences, where they hold 31 percent of faculty positions, followed by 21 percent in physical and related sciences, 20 percent in computer and mathematical sciences, and 14 percent in engineering. The pattern in women’s representation across disciplines differs, however, among the largest racial and ethnic groups. For white women, the highest level of representation is in the biological, agricultural, and life sciences, and the lowest is in engineering. In contrast, Asian American women are best represented in computer and mathematical sciences, and worst represented in physical and related sciences.

<sup>15</sup> Population figures are based on IWPR calculations of 2011 IPUMS American Community Survey microdata (Ruggles et al. 2010).

For underrepresented minority women, the highest level of representation is in the biological, agricultural, and other life sciences, and the lowest is in computer and mathematical sciences. The numbers and proportions of underrepresented minority women in the STEM professoriate remain extremely low across all disciplines, with, for example, only approximately 300 underrepresented minority women in computer and mathematical sciences, 400 in engineering, and 500 in physical and related sciences (Appendix Table A1).

The underrepresentation of women in STEM relates to a range of institutional and structural factors, including unsupportive work environments, their relatively limited access to mentors and sponsors (University of Michigan 2002 and 2004; Turner 2002), and employer policies that make it difficult to balance the demands of an intense work schedule with family responsibilities (Budil et al. 2005). As these factors indicate, female faculty members in STEM may encounter discrimination that manifests itself in both subtle and not-so-subtle ways. For example, one study found that outside reviewers and search committee members were less likely to vote to hire a female scientist than a male scientist with equal qualifications. They were also less likely to recognize the accomplishments of female scientists (Steinpreis, Sanders, and Ritzke 1999). In addition, tenure and promotion committees often use evaluation criteria that place women at a disadvantage (Park 1996). They tend to value research (which men, as a whole, spend more time on than women) more highly than teaching and service activities (which women spend more time on than men; Park 1996).

Research points to other ways that discrimination affects the experiences of female scientists. Peer reviews for academic journals, for example, may reflect gender bias that places women at a disadvantage: one study found that an ecology journal's introduction of a "double-blind" review policy led to a 7.9 percent increase in the proportion of articles published by female first authors (Budden et al. 2008). A recent study also indicates that gender bias affects the opportunities given to students as well as faculty. When asked to review the application materials of a student applying for a lab manager position who was randomly assigned either a male or female name, science faculty—including both men and women—were more likely to rate the male applicant as significantly more competent and hireable than the female applicant and deserving of a higher starting salary (Moss-Racusin et al. 2012).

While all women in STEM disciplines may encounter bias and discrimination, women of color experience compound marginalization: they are marginalized both as women and as racial or ethnic minorities. The multiple marginality that women of color experience is often exemplified in negative stereotypes that others hold about them (Carlone and Johnson 2007; Turner 2002) and in their lack of access to influential networks and opportunities (Turner 2002). This marginalization is reinforced by a lack of research reflecting the experiences of women of color. Between 1970 and 2008, only 116 published or unpublished works on women of color in STEM were produced, with few studies addressing the circumstances of women of color at the advanced career level (Ong et al. 2011).

**For underrepresented minority women, the highest level of representation is in the biological, agricultural, and other life sciences, and the lowest is in computer and mathematical sciences.**

Despite the significant challenges they face, many women faculty of color are highly successful as scholars, professors, and leaders in their fields. "Accelerating Change" was designed to address not only the obstacles that can inhibit progress for women of color, but also factors contributing to their success and policy and programmatic initiatives that can speed the pace of change. Such initiatives must be implemented and expanded, in part through greater coordination and collaboration among those working to advance the status of women faculty of color in STEM. Increasing the representation of women of color in STEM faculty and supporting their continued advancement will benefit the scientific community and nation as a whole.



# Opening Remarks / Building New Alliances for Policy Change



**HEIDI HARTMANN, PH.D.**  
*President, Institute for Women's Policy Research*



**KELLY MACK, PH.D.**  
*Executive Director, Project Kaleidoscope, Association of American Colleges and Universities (AAC&U)*

The conference began with opening remarks from Heidi Hartmann, President of the Institute for Women's Policy Research, and Kelly Mack, Executive Director of Project Kaleidoscope at the AAC&U. Dr. Hartmann said that over the past 25 years since its founding, the Institute for Women's Policy Research has worked on several projects to increase the representation of women in STEM and has been delighted to revisit the issue with support from the ADVANCE program at the National Science Foundation. She emphasized that while there has been considerable progress for women of color in STEM fields, much remains to be done. Dr. Hartmann thanked the conference organizers for their work and the expert attendees for their participation. She introduced the conference facilitator, Heather Berthoud, who had worked with IWPR staff to develop the agenda, articulate the convening goals, and structure the event in a way that would most effectively capitalize on the knowledge and expertise in the room.

Dr. Mack reiterated the pressing need for events such as "Accelerating Change" and the power these events have, both for individuals who attend and for the scientific

**"There is so much that still needs to be done to promote more women of color on STEM faculties in our universities."**

**“What we learned from [Sojourner Truth] is to make absolutely certain that what we say and what we do on behalf of women of color will be so profoundly revolutionary that our contemporaries will have no choice but to record and consider it and history will have no choice but to preserve it. So that even if we cannot change the situation today, our daughters, granddaughters, and great granddaughters of the academy will know unequivocally of our strength, our intellect, our values, and our hope for a better day for them.”**

community as a whole. “It’s always an honor to be able to address a women-of-color-friendly audience,” she said. “But we should not neglect to expend the energy and effort needed to convince all our colleagues that the experiences of women of color in the academic STEM disciplines are indeed uniquely different.” Sojourner Truth, in her famous “Ain’t I a Woman” speech in 1851, captured the attention of “an audience of naysayers, declaring that she was still a woman even though she had not been helped into carriages or lifted over mud puddles or given any best place.” Today, Dr. Mack said, even though women of color have earned Ph.D.s, published papers, and educated students, the data still show that they are “least likely to be helped into circles of privilege within the academy...or provided with the best of places that are ideally and optimally suited to advance women of color professionally.” She suggested that while the conference participants cannot solve all the problems for women of color in STEM in one day, they can be revolutionary and bold in their thinking and provide radical recommendations. Dr. Mack ended by asking those present to focus on the “grand body of work” they represent and “the potential for dramatic change.”



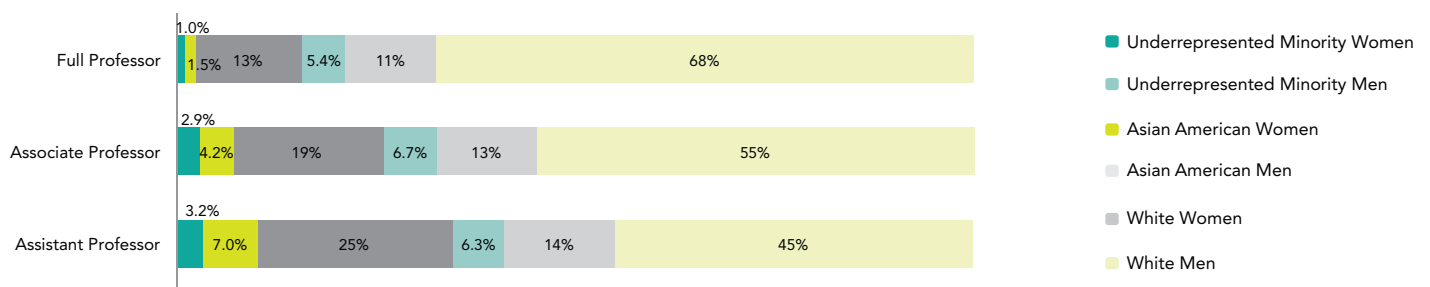
# Framing the Issues / The Current Status of Women Faculty of Color in STEM

The opening session of “Accelerating Change” provided a broad perspective on the current state of women faculty of color in STEM and discussed data that illuminate areas of progress, as well as places where little progress has been made. Dr. Jong-on Hahm, session moderator and Program Manager for Europe and Eurasia at the National Science Foundation’s Office of International and Integrative Activities, opened the conversation by noting that experts have discussed the reasons for the underrepresentation of women of color in STEM for quite a long time.

“We have been studying these issues for a very long time—too long.”

Dr. Hahm presented recent data showing that between the level of assistant and full professor, the representation of women of color—which is quite small even at the lowest level—decreases. As Figure 3 shows, underrepresented minority women with

**Figure 3 / Distribution of Women and Men with STEM Doctorates Employed as Faculty at Four-Year Colleges, Universities, and Affiliated Centers and Institutes, by Race/Ethnicity and Faculty Rank, 2010**



Notes: STEM fields include the biological, agricultural, and other life sciences; computer and mathematical sciences; physical and related sciences; and engineering. Whites and Asian Americans refer to persons who are not of Hispanic origin. “Underrepresented minorities” includes blacks, Hispanics, American Indians/Alaska Natives, Native Hawaiians/Other Pacific Islanders, and those reporting more than one racial category. Figures include faculty at four-year colleges or universities, medical schools (including university-affiliated hospitals or medical centers), and university-affiliated research institutes who are U.S. citizens or permanent residents.

Source: IWPR analysis of special tabulations of data from the National Center for Science and Engineering Statistics’ 2010 Survey of Doctorate Recipients provided by the National Science Foundation.



**Between the level of assistant and full professor, the representation of women of color—which is quite small even at the lowest level—decreases.**

**Most STEM programs and societies serve women or underrepresented minorities (URMs) but do not focus specifically on women of color. Such approaches contribute to a lack of recognition of the important intersection between gender and race/ethnicity.**

STEM doctorates are 3.2 percent of assistant professors, 2.9 percent of associate professors, and 1.0 percent of full professors. Among Asian American and white women, similar declines take place. The percentages of faculty positions held by underrepresented minority and Asian American men are also lower at the level of full professor than assistant professor, but the differences are proportionally less. White men with STEM doctorates, however, have the highest and most consistent levels of representation throughout the professorial ranks. They hold 45 percent of assistant professorships, 55 percent of associate professorships, and 68 percent of full professorships.

These data point to the need to better understand not only the factors that make it difficult for women of color to pursue STEM academic careers in the first place but also the challenges they face in advancing in these careers. What are the key barriers that prevent women of color from moving up through the faculty ranks in STEM fields? What light does current research shed on these barriers, and what additional studies could further illuminate patterns in the data currently available? What new data need to be collected? And how might key stakeholders leverage existing resources to facilitate the advancement of women of color in academic STEM careers? The three presenters in the convening's first session addressed these questions from the perspective of their own experience and work.



**LORELLE ESPINOSA, PH.D.**  
*Senior Analyst, Abt Associates*

Dr. Espinosa presented findings from “Inside the Double Bind: A Synthesis of Empirical Research on Women of Color in Science, Technology, Engineering, and Mathematics,” a project that explored in depth the available literature about individuals who “traverse the double bind and the programs and institutions with which they interact” (Ong et al. 2011). She commented that there is a gap in mainstream efforts to diversify representation in STEM: most STEM programs and societies serve women or underrepresented minorities (URMs) but do not focus specifically on women of color. Such approaches contribute to a lack of recognition of the important intersection between gender and race/ethnicity. As it stands, women of color continue to be less likely than their male counterparts and white women to earn doctorates in STEM fields and to hold STEM positions, both in academia and in other sectors. This underrepresentation harms the STEM fields as a whole: women of color have enormous potential to bring new ideas and perspectives to these fields, yet their talent often goes untapped.

Dr. Espinosa observed that while research on the career experiences of women of color in STEM faculty positions remains limited, available data indicate that in the STEM professoriate, women of color tend to hold lower ranks than white women and are concentrated in lower-status institutions. One study providing basic demographic statistics on tenured and tenure-track faculty in the top 100 university STEM departments (as ranked by the National Science Foundation) found that

underrepresented minority women appear in small numbers on these STEM faculties and are almost nonexistent on physical science and engineering faculties. Further, most of the few underrepresented minority women who hold full professorships in STEM fields at these schools were not born in the United States (Nelson and Brammer 2010).<sup>16</sup>

Multiple factors contribute to the low representation of women of color on STEM faculties in general and especially in the highest positions. According to Dr. Espinosa, research indicates that faculty members of color often experience the burden of being singled out to serve on diversity committees, mentor students, and take on other service activities. These demands can impede their advancement, since many institutions do not highly value or reward such service (Turner 2002). Minority women also report spending more time on instructional activities and less time on research than their male counterparts (Malcom and Malcom 2011), which can hinder their career advancement in academic institutions.

Dr. Espinosa said that “social climate” also shapes the experiences of women of color in STEM. At colleges and universities, one factor contributing to the social climate is the quality of relationships between students and faculty members, which Dr. Espinosa noted can be either very encouraging or strained and discouraging. While much of the literature on social climate focuses on undergraduate and graduate students, Dr. Espinosa suggested that at the career stage relationships are also critically important. In one study for which ten African American female STEM faculty members were interviewed about their career experiences, respondents reported having developed expectations for tenure early in their faculty careers. Over time, however, they became frustrated with the lack of clear and consistent information they received about the tenure process and began to lose trust in their peers and colleagues. The author of the study describes the faculty members interviewed as “successful women with wounded spirits,” indicating that although they persevered and advanced in their careers, the women experienced relationships and injustices that resulted in lasting harm (Lucero 2003).

<sup>16</sup> The phrase “underrepresented minorities” here includes blacks, Hispanics, and Native Americans (Nelson and Brammer 2010). Because Asian Americans are better represented at most points in the academic pipeline than in the United States population as a whole, they are often not considered to be an underrepresented minority group, although they are a minority group in the U.S. population (Nelson and Brammer 2010). Given the underrepresentation of Asian American women at the advanced levels of academia in STEM disciplines (as shown in Figure 3), however, their experiences in these disciplines are important to consider.

**“It’s almost like we’re pets and threats.... Pets are often women who are newcomers, the first of the kind in their unit. People assume they are there for diversity and to help make the unit look good.... In contrast, senior women of color often find that they are perceived as threats to the status quo.... They have stayed the course and exceeded expectations but haven’t received the same rewards and recognition as their male counterparts.”**



**KECIA THOMAS, PH.D.**

*Professor of Industrial-Organizational Psychology and Senior Advisor to the Dean for Inclusion and Diversity Leadership, University of Georgia*

Dr. Thomas, of the University of Georgia, also discussed barriers that hinder progress for women of color in academic STEM workplaces, drawing on literature on physical environments and identity cues, harassment, the glass ceiling, what she names the “pet to threat” career transition, and workplace climate and diversity ideologies, especially as expressed through microaggressions and incivilities. She began by noting that physical environments can signal who does and does not belong; when work environments are “gender neutral,” women are more likely to feel welcome and interested in remaining in the workplace. While in some instances work environments contain subtle cues indicating that some individuals do not belong, in other cases they are places where people experience outright hostility. Unfortunately, many women of color find that racial and sexual harassment is a reality they encounter in the workplace (Berdahl and Moore 2006; Krieger et al. 2006). These experiences can affect their performance, success, and retention rates in STEM academic workplaces, as well as in other work environments.

Dr. Thomas observed that the “glass ceiling”—the invisible barrier that keeps women and people of color from positions of authority and influence—can also impede the progress of women of color in academic STEM workplaces. Although the extensive literature on the glass ceiling focuses primarily on women’s experiences in corporations, it has implications for the experiences of women of color in academic STEM departments. Often, those who seek to explain why so few women have progressed to the upper ranks of corporations say there are not enough women in the pipeline with the right experiences, and women are less committed or have conflicting interests. Yet, women who have reached these high-level positions offer a different perspective: they attribute the underrepresentation of women in the upper ranks to factors such as the dominant cultures in their organizations, restrictive stereotypes about women, and women’s more limited access to informal mentors and networks. According to Dr. Thomas, in academic STEM workplaces as well as in corporations, these “climate issues” often prevent white women and women of color from being perceived as viable candidates for the jobs to which they apply and from receiving promotions if they do secure lower-level positions.

The climate issues that many women of color experience in academic STEM workplaces also include “microaggressions and incivilities,” which Dr. Thomas defined as common indignities that are often unintentional but that nonetheless send messages of racial insult or invalidation. For example, a comment such as “you’re so articulate” may, on the surface, seem like a compliment, yet the underlying assumption of the statement is that people of color are generally not very smart and it is unusual for someone of this group to be intelligent (Sue et al. 2007). Similarly, the statement made by a white woman to a woman of color that “as a woman, I know what you go through as a racial minority” represents a “microinvalidation” that denies the person of color’s very real experiences of racism (Sue et al. 2007). Such

microaggressions and incivilities make academic and other workplaces unsafe for women of color and have consequences for their physical and emotional well-being over time.

Some academic departments intensify the unwelcoming nature of the workplace climate by adopting a “colorblind” approach to dealing with diversity rather than a multicultural approach. Whites who manifest an ideology of colorblindness, Dr. Thomas explained, tend to ignore differences (“we’re all human”), which silences and stigmatizes diversity. In contrast, multiculturalism acknowledges differences and embraces diversity. Research indicates that people of color’s level of engagement is lower in departments where whites adopt a colorblind approach than in departments where whites exhibit a multicultural ideology (Plaut, Thomas, and Goren 2009). For women of color in academic STEM workplaces, multiculturalism represents one factor that can contribute to their desire to persist in their careers.

Women of color who pursue and advance in academic STEM careers often experience a phenomenon that Dr. Thomas is investigating in her qualitative research, the “pet to threat” phenomenon. “Pets” are women of color who are newcomers or the first of the kind in their unit; they are isolated tokens and usually have less experience than their peers, which often leads people to assume they are there to satisfy diversity concerns or because of affirmative action. Pets are generally seen as an asset to their unit because they make it more diverse, but they often feel patronized and sometimes overprotected, while their peers assume they are overrewarded because of their rarity. These junior faculty members (or “pets”), Dr. Thomas said, are vulnerable to benevolent or paternalistic prejudice. As they progress in their careers, they often become “threats”—senior faculty members who are still isolated but are now perceived as challenging the status quo. Women of color who are “threats” tend to receive less recognition for their accomplishments than their white and male counterparts.

**The climate issues that many women of color experience in academic STEM workplaces also include “microaggressions and incivilities”—common indignities that are often unintentional but that nonetheless send messages of racial insult or invalidation.**



**DR. SHIRLEY MALCOM, PH.D.**

*Head, Directorate for Education and Human Resources Programs, American Association for the Advancement of Science*

Dr. Shirley Malcom, of the American Association for the Advancement of Science, built on the session’s first two presentations by exploring strategies for improving workplace climates. She began with an example from her own experience. After being nominated by President Clinton to the National Science Board in 1993 and joining the board as the only African American and one of two women, Dr. Malcom said she learned an important lesson: minority women in STEM need to use the resources that are available to them to effect change. “We’re not going to be able to change the world into what we want,” she said, “so it’s important to use what we have.” These resources might include, for example, careful preparation, which is all too rare within any group and therefore makes a person stand out. Taking the time to thoroughly review important documents before a meeting and then making one or two insightful, well-informed comments on substantive points—especially where

**“You have power inside of your institutions...you have more leverage than you may think. You can make institutional policies.... It’s a matter of getting inside [these] policies and using them as levers.”**

**Policies—with a big “P” and little “p”—are another important resource for change. STEM policy is not just about government (big P): “you have to find out where the cracks are and move into them to change the situation for minority women.”**

they are unrelated to diversity—can enable minority women to “flip status,” so they are no longer overlooked or unrecognized but now perceived as leaders in the field and important contributors to the conversation.

Policies—with a big “P” and little “p”—are another important resource for change. STEM policy, Dr. Malcom said, is not just about government (big P). Universities and professional societies also have policies that represent important levers for change: “you have to find out where the cracks are and move into them to change the situation for minority women.” Dr. Malcom pointed to the Handbook on Diversity and the Law: Navigating a Complex Landscape to Foster Greater Faculty and Student Diversity in Higher Education as one resource that provides guidance for college and university policy leaders on how they can increase the gender and racial diversity of their STEM faculties and student bodies within the bounds of the law. The Handbook covers not only admissions and enrollment but also other factors that are important to diversity efforts on campus, such as financial aid, outreach programs, and faculty recruitment and hiring (American Association for the Advancement of Science 2010).

Dr. Malcom discussed several ways that people can use institutional and departmental policies to address the climate issues many women of color face. Vice presidents for diversity who are involved in search processes can talk with deans before the searches begin about processes being put in place to achieve gender and racial diversity and the expectations for a diverse pool that should be required for a particular group of candidates. Colleges and universities can also make institutional policies that specify that those who chair search committees must receive training on issues of diversity and sexual/racial harassment. In addition, Dr. Malcom pointed out that many institutions conduct climate surveys, and these surveys can gather data on the experiences of female minority faculty members. While the small numbers of STEM women faculty of color may make it hard to report the data, simply inserting questions about climate issues affirms the importance of these issues and gives individuals with power to address them some leverage for doing so.

An additional avenue for effecting change involves clearly articulating what women of color need to succeed and helping them set goals related to these objectives. Dr. Malcom noted that this applies to students and faculty at all levels. For example, some granting agencies require postdoctoral fellows to spell out exactly what their work plan is for their postdoctorate fellowship. This presents an opportunity for the students to say if their goals include factors such as producing more publications, having travel funds and opportunities to present, or having a chance to go to meetings so they can network. Putting such goals on record helps to increase the chances they will be realized. Likewise, Dr. Malcom pointed out that faculty members can request a performance review every year and ask at this review what they need to achieve to move to the next level. By asking these questions, they can have the criteria for their promotion put on record, helping to ensure a more transparent and fair evaluation process.

## Discussion

The first session's presentations underscored that while a substantial body of literature addresses the current state of women of color in STEM disciplines, research on the experiences of women faculty of color and strategies for promoting their representation and advancement remains limited. Following the presentations, participants were asked to consider the gaps in available information in this area by discussing three questions in small groups:

1. Is there additional background information that we should consider on either the status of women faculty of color in STEM or remaining challenges that hinder their progress?
2. What promising trends in overcoming these challenges are you aware of?
3. What factors account for the success of these trends?

Participants reported the highlights of their conversations to the full group in a discussion led by the conference facilitator. The bulk of the "report back," or large group discussion, focused on the need for additional information to understand the challenges that hinder the progress of women faculty of color in STEM. Participants suggested a need for more research that explores:

- *How the intersection of race, ethnicity, and place of birth relate to the status of women faculty of color in STEM.* Several participants pointed out that it is important to disaggregate data on women of color in academic STEM positions by place of birth, in part to paint a clearer picture of the status of U.S.-born women of color in STEM. One participant, however, cautioned that such research must be undertaken with care to ensure that it is inclusive of both non-U.S. and U.S.-born faculty members.
- *Utilization of initiatives to support work-life balance among faculty.* Work-life balance issues are of particular concern to women, who often bear the lion's share of caregiving responsibilities within families. To what extent have programs and policies to help STEM faculty members establish balance in their lives been used, and what additional supports in this area are needed?
- *Reasons that women of color with higher degrees in STEM are more likely than whites to work in nonacademic jobs.* Research indicates that many women of color with STEM doctorates are less likely than comparable white women to be employed in academic positions (National Science Foundation 2013a). To what extent do women of color choose to work in nonacademic settings, and what are some of the reasons for this choice? To what extent are women of color forced out of the academy by their inability to find jobs, "social climate issues," or other factors?
- *Factors contributing to the underrepresentation of women faculty of color in fields that are heavily dominated by whites and men, such as physics and computer science.* Much could be learned from studying the status of women of

**Those who chair search committees must receive training on issues of diversity and sexual/racial harassment. In addition...many institutions conduct climate surveys, and these surveys can gather data on the experiences of female minority faculty members.**



color in fields where progress has been especially stunted.<sup>17</sup> What are the factors that have slowed their progress? What programs or initiatives have addressed these factors, and what are their key elements of success? One participant said that conversely, it would be helpful to study contributing factors to success in STEM fields that have experienced greater progress for women of color. Which disciplines have made the greatest strides in hiring and recruiting women faculty of color? What strategies have these disciplines employed?

- *The roles of both sponsorship and mentoring in promoting the advancement of women faculty of color in STEM.* Mentoring receives frequent mention as a practice that can help women faculty of color in STEM advance, yet recent literature also identifies sponsorship as integral to women's career advancement. The two practices differ: a mentor is a person with experience who gives support and advice on how to succeed in the job and comes to know the "mentee" on a personal as well as professional level, while a sponsor not only provides professional guidance and advice but also advocates on behalf of those they are sponsoring to help them advance (Toppins 2010). Are both mentoring and sponsorship integral to promoting women faculty of color in STEM? If so, what is the relationship between these practices?

Participants also discussed strategies for speeding progress. Proposed strategies include striving to get academic departments to shift from a colorblind to a multicultural perspective and encouraging accrediting agencies to incorporate issues related to women faculty of color in STEM into their accreditation process so colleges and universities will be more likely to focus on these issues. One group also talked about the need to influence top university and college leadership and to address, in conversations with these leaders, the common objection that in the current fiscal climate funds are insufficient to support diversity initiatives or programs.

<sup>17</sup> On the status of women of color in computer science, see Ong 2011.



# Breaking Barriers, Building Bridges / Promising Practices to Increase the Representation of Women Faculty of Color in STEM

The second session of the day focused on identifying promising programs and practices for increasing the representation of women faculty of color in STEM and facilitating their career advancement. Led by moderator Dr. Christine Grant, Associate Dean for Faculty Development and Special Initiatives and Professor of Chemical and Biomolecular Engineering at North Carolina State University, the session included presentations from Dr. Marigold Linton and Dr. Anny Morrobel-Sosa. They reflected on their personal experiences as women faculty of color in psychology, chemical engineering, physics, and chemistry, including their experiences with successful initiatives to increase the representation, promotion, and retention of women of color in the STEM academy. As Dr. Grant pointed out, a number of promising programs and models already exist; and program leaders, policymakers, and others can learn much from their successes.

Dr. Grant opened the session by emphasizing the importance of sharing the experiences of women of color STEM faculty, so they are not viewed merely as “data points” in demographic research. Holding up a recent publication from the National Research Council and citing a report from the National Academy of Sciences, she praised the proliferation of social science research on diversity among academic faculty but noted the failure of much of this work to authentically engage and address the specific experiences of women of color. Dr. Grant said it is important to understand how the experiences of women of color vary across institutional climates and disciplines. She also highlighted the importance of sharing the experiences of women faculty of color in STEM to create a common sense of identity and community, as well as to inform institutions and individuals about the challenges and barriers these women face. Dr. Grant suggested that this information is essential for instituting more effective programs that address the challenges faced by women of color in STEM and for bringing existing models to scale.

Dr. Grant recognized that many programs have already sought to address the isolation of women faculty of color in STEM. One NSF ADVANCE initiative held peer-mentoring summits at North Carolina State University for women of color engineering faculty across institutions and the nation to develop a sense of group cohesion and commonality among peers and to connect women of color to peer

**“The concept of being ‘more than a data point’ is something that I’ve been really passionate about for the last few years—that women of color are more than just people to be studied or blips on the chart that we can’t measure because there are so few of us. We are women with stories and experiences.”**

**Dr. Linton received the NSF Presidential Award for Excellence in Science, Mathematics, and Engineering Mentoring (PAESMEM) from President Obama in 2009.**

mentors. By introducing faculty members to others in their field, the summits provided opportunities for future research collaborations. The effort was co-led by Dr. Grant and Dr. Jessica DeCuir-Gunby of North Carolina State University.

Other initiatives include the ADVANCE-PAID initiative to advance women in engineering and technology at historically black colleges and universities (HBCUs). Led by Dr. Felicia Nave at Prairie View University, this initiative's activities entail holding professional development and leadership workshops, creating new mentoring relationships, providing seed grants, and developing a toolkit to help female faculty advance in their careers at HBCUs.<sup>18</sup> Another initiative, the NSF-funded program FORWARD to Professorship (Focus on Reaching Women for Academics, Research and Development in Science, Engineering and Mathematics), represents a joint effort of Gallaudet and George Washington Universities in Washington, DC, to provide resources, training, and support to pre-tenure female and minority faculty members in STEM disciplines. One FORWARD workshop, led by Dr. Isabel Escobar at the University of Toledo, sought to help pre-tenure women faculty of color in STEM in the Midwest secure research funding, navigate the tenure process, and network with other women of color in STEM.

Dr. Grant emphasized the importance of recognizing the successes of such programs to date and using them as models for next steps, rather than creating new programs that simply reinvent the wheel. She also emphasized the importance of drawing on the experiences of women faculty of color in STEM to further develop and expand existing promising programs.



**MARIGOLD LINTON, PH.D.**

*Director, American Indian Outreach, University of Kansas*

**“Promising practices involve finding a wide range of partners and remembering that in a world changing around us, yesterday’s solutions may not fit today.”**

Dr. Linton provided an overview of her work in leading and founding initiatives to promote and encourage minorities and women faculty in STEM disciplines. She began with her experience of being born and raised on the Morongo Reservation in southern California, where she faced poverty, discrimination from peers due to her accent, and a lack of academic support. Dr. Linton identified limited economic resources and social and academic isolation as factors contributing to the low rates of college matriculation in her community. Of all of the teachers she had as a child and adolescent, only one ever visited the reservation. This teacher, Dr. Linton said, contributed to her success and motivation to succeed in academics by encouraging her and providing a promising vision of Dr. Linton's future.

Dr. Linton emphasized the importance of interorganizational and multi-institutional collaborations in helping to mitigate challenges that many women of color face as both students and professors, such as a lack of access to resources and mentoring

<sup>18</sup> See <<http://advancehbcuwomenfaculty.org/about-us/>> (accessed November 5, 2013).

opportunities, discrimination, and isolation. Such collaborations can include partnerships among college and university systems, professional societies, faculty members from different states, and American Indian reservations and nations, among others.

Dr. Linton cited examples of such collaborations, including the Rural Systemic Initiative (which connects groups in Arizona, Colorado, New Mexico, and Utah), a partnership between the Haskell Indian Nations University and the University of Kansas, the Scholars in Science: Native American Path (SSNAP) program, and the Society for Advancement of Chicanos and Native Americans in Science (SACNAS) Leadership Institute. These partnerships have worked to connect Chicano and Native American faculty and students to training, mentoring, and higher education opportunities by engaging networks and supportive communities. Dr. Linton herself has been a pioneer and leader in these initiatives and received the NSF Presidential Award for Excellence in Science, Mathematics, and Engineering Mentoring (PAESMEM) from President Obama in 2009 for her efforts.



**ANNY MORROBEL-SOSA, PH.D.**

*Provost and Senior Vice President for Academic Affairs,  
Lehman College*

Dr. Anny Morrobel-Sosa opened her remarks by describing her upbringing and family's circumstances. As an immigrant of color raised by a single parent without a high school diploma, she had limited access to both material resources and to information about the academic pipeline. Dr. Morrobel-Sosa recalled her experience of feeling like a "lost data point," or an isolated anomaly in the fields of physics and chemistry and in higher education. She emphasized the importance of building bridges and expanding and developing promising practices, rather than simply continuing to talk about how women faculty of color in STEM experience barriers to advancement and success.

Dr. Morrobel-Sosa said that "intrusive" (or proactive) recruitment and mentoring was integral to her advancement and success. With encouragement from an academic undergraduate advisor who invested in his students' future professional success, and often pushed them beyond their comfort zones, Dr. Morrobel-Sosa applied to graduate school. She said that throughout her professional career, she was fortunate to have numerous classmates, lab mates, advisors, and mentors—many white and/or male—who actively supported her. Dr. Morrobel-Sosa expressed her belief that intervention and guidance from mentors is critical to increasing the representation of women of color in higher faculty ranks in STEM fields.

Dr. Morrobel-Sosa outlined societal and STEM-specific trends that she believes should generate optimism about increased diversity in STEM faculty. Growing awareness and dialogue about the experiences of women of color, increased collaboration and information-sharing among the younger "digital" academic cohorts, the expanded popularity of science and mathematics among the general

**"Where do I see some of the advances for the future? Clearly the efforts generated by the [NSF] ADVANCE project have influenced many of our institutions. One of the elements that we have talked about is an active and intrusive recruitment strategy.... Also, the concept of cohort hiring [can help] avoid the isolation."**

**Intervention and guidance from mentors is critical to increasing the representation of women of color in higher faculty ranks in STEM fields.**

public (the “CSI Factor”), and the potential changes to arise from immigration policy reform in the United States could strengthen efforts to promote women faculty of color in STEM.

Dr. Morrobel-Sosa outlined a set of recommended practices to promote progress. Special attention be paid to initiatives and programs that directly address the isolation of women faculty of color in STEM and the lack of mentoring they receive. For example, colleges and universities should be encouraged to use active or “intrusive” recruitment strategies for women faculty of color, to support cohort and/or dual-career hiring practices to avoid the social isolation often experienced by new hires, increase professional development opportunities for women faculty of color in STEM, and expand opportunities for mentoring to retain more women faculty of color in STEM. She also suggested that the National Science Foundation’s ADVANCE initiative support more work on the intersection of race and gender.

## **Discussion**

The presentations for the convening’s second session provided first-hand and research-based information on promising programs and practices that could be replicated or brought to scale to support and advance women faculty of color in STEM. Following the presentations, meeting participants discussed three questions in small groups:

1. If you could take one or two promising programs for increasing the representation of women of color in STEM faculty positions to scale, what would they be?
2. What are some strategies for taking existing promising models to scale?
3. What key programmatic shifts need to be made to promote the advancement of women of color in STEM disciplines?

After the small group conversations, Dr. Grant facilitated a discussion among the whole group about key insights that had emerged. Participants echoed many points raised by the panelists and suggested other programs to replicate or expand, such as the Diversity Initiative for Tenure in Economics at Duke University, the National Science Foundation’s Opportunities for Underrepresented Scholars program, the Preparing Critical Faculty for the Future (PCFF) program of the American Association of Colleges & Universities, the American Council on Education’s leadership training programs for academic administrators, the Center for Faculty Success at Purdue University, and the Women Chemists of Color program of the American Chemical Society. Participants also recommended strategies for taking existing programs to scale. These recommendations include:

- *Expanding mentoring opportunities for women faculty of color.* Participants suggested that institutions can create new opportunities for mentoring by pairing junior faculty with mentors and providing social network supports within departments and across institutions. In creating these opportunities, they should give careful attention to the benefits of peer and cross-cultural mentoring.

- *Increasing cross-institutional collaborations.* Participants suggested that key stakeholders can create new collaborations by encouraging professional societies, national nonprofit organizations, governmental organizations, and universities to come together around the goal of increasing the representation of women faculty of color in STEM disciplines. Participants named the National Institutes of Health, the Association for Women in Science (AWIS), and other women's organizations as promising organizations to engage.
- *Expanding efforts to combat the social isolation of female faculty of color.* Participants suggested replicating and expanding cluster hiring practices. Participants also identified a need to expand programs that offer skills-based training opportunities for women of color entering or in the early stages of the faculty pipeline (such as the American Association of Colleges and Universities program focused on developing leadership skills for women faculty of color in STEM), as well as programs that educate academic administrators, other faculty members, and institutions overall about gender and racial/ethnic discrimination.





# Policy and Progress / Expanding Opportunities for Women Faculty of Color in STEM

The convening's third session focused on existing STEM-related policies and policy changes needed to advance the careers of women faculty of color. Dr. Wanda Ward, Office Head of the National Science Foundation's Office of Integrative Activities, moderated the session. She provided some historical perspective, observing that since the inaugural days of "The Double Bind" conference in 1975, female scientists of color and others have led educational and cultural change efforts to advance the STEM careers of women of color. While progress has been made, much remains to be done to address their continued invisibility and isolation. When researchers examine the data by discipline, major participation gaps for women of color are revealed—and the picture becomes even bleaker when they disaggregate these data by specific underrepresented racial and ethnic groups.

Dr. Ward noted that expanding opportunities for women of color in STEM is becoming a national priority, in part due to anticipated growth in the STEM fields. A recent report by Georgetown University researchers found that STEM jobs make up a growing share of all jobs in the U.S. economy. Between 2008 and 2018, the number of STEM jobs is projected to increase by 17 percent, while the total number of jobs will grow by only 10 percent (from 148 million to 162 million; Carnevale, Smith, and Melton 2011).<sup>19</sup> These data, Dr. Ward said, motivated policymakers, including Congresswoman Eddie Bernice Johnson, to develop legislation to ensure that federal science agencies and institutions of higher education receiving federal research and development funding fully engage the entire talent pool.<sup>20</sup>

**Between 2008 and 2018, the number of STEM jobs is projected to increase by 17 percent, while the total number of jobs will grow by only 10 percent (from 148 million to 162 million).**

<sup>19</sup> STEM is defined here to include computer science, mathematics, architectural science, engineering, and life and physical sciences.

<sup>20</sup> For more information on this legislation, see <<http://thomas.loc.gov/cgi-bin/bdquery/z?d112:hr889:>> (accessed August 20, 2013), <<http://thomas.loc.gov/cgi-bin/bdquery/z?d112:hr4483:>> (accessed July 31, 2013), and <<http://thomas.loc.gov/cgi-bin/bdquery/z?d113:hr1358:>> (accessed August 20, 2013).

**“A lot of scholars, policymakers, and practitioners have asserted, as we have today, that structural changes are needed in the form of policies for the STEM enterprise to be diverse, equitable, and accessible.”**

In March 2011, Rep. Johnson introduced the Fulfilling the Potential of Women in Academic Science and Engineering Act (H.R. 889), which seeks to address gender disparities in federal funding, directs federal science agencies to develop policies that support STEM university faculty with caregiving responsibilities, and requires the National Science Foundation to provide detailed demographic data on STEM faculty. Rep. Johnson also introduced the Broadening Participation in STEM Education Act (H.R. 4483) in April 2012. This bill would require the director of the National Science Foundation to award competitive grants to higher education institutions to create or expand reforms in undergraduate STEM education that ensure greater participation among underrepresented minority students. In March 2013, Rep. Johnson introduced the STEM Opportunities Act of 2013 (H.R. 1358), which seeks to address issues outlined in the two previous bills, including work-life balance, the need for better data collection, and the need for improved recruitment and retention practices and campus climate.

The speakers and participants for the third session were charged to explore how the nation and institutions can establish policies to expand opportunities for women of color in STEM. Such policies have to address structural barriers and encourage accountability, as well as recognize and reward successful efforts at promoting women of color in STEM. There is an “innovation imperative” to increase the role of women of color in advancing the nation’s global leadership in STEM: “We have to leverage the observations that women of color are creative and work well in collaborative teams...today’s innovation requires a diversity of perspectives across disciplines and human capital resources.”

Dr. Ward went on to note that the National Science Foundation (NSF) is working to create new models and partnerships that value preparing and engaging a diverse workforce to “transform the frontiers of science.” Some examples of this work include a recent policy statement issued by the Directorate of Biological Sciences that specifies that any support sought for conferences must include women and persons with disabilities (a directive that NSF is moving to expand throughout its directorates and offices), and the ADVANCE program’s support for several initiatives to specifically address the status of women of color in STEM, such as the STEM Women of Color Conclave<sup>®</sup> and Howard University’s ADVANCE-IT: Women Faculty of Color in STEM as Agents of Change. In addition, the NSF Career-Life Balance initiative launched several years ago reflects the foundation’s commitment to improving conditions for women in STEM disciplines.<sup>21</sup> In the presentations that followed, speakers identified work-life balance issues as a particular challenge for women of color in STEM.

<sup>21</sup> See <<http://www.nsf.gov/career-life-balance/brochure.pdf>> (accessed July 31, 2013).



**MARIA (MIA) ONG, PH.D.**

*Senior Researcher and Evaluator, Education Research Collaborative, TERC*

Dr. Ong began by noting the importance for younger female students of being exposed to women faculty of color in STEM: “young women of color watch their faculty very carefully.” When they have faculty role models who are women of color, young students of color are more likely to feel inspired and encouraged to pursue STEM education and careers. Given the relatively small numbers of women of color who are employed as faculty members at universities and colleges, however, many female students of color have few role models. This lack of role models can result in self-doubt and isolation (Ong et al. 2011).

Dr. Ong pointed out that increasing the number of women faculty of color who can serve as role models for younger students will require improving not only recruitment practices but also practices to facilitate retention and advancement. She suggested several changes to help colleges and universities retain women faculty of color and enable their progression through the faculty ranks. The first involves increasing the recognition that women faculty of color receive from other scientists for their work. Often, the contributions of women of color scientists are overlooked and underrewarded. To increase the visibility of their work and ensure that their research is acknowledged, Dr. Ong suggested that the National Academies might host an awards dinner that brings together women of color students in STEM, leading women of color educators and professionals in STEM, and others who work with this population.

Another strategy for increasing the recognition that women of color scientists receive involves ensuring that their work is published. Dr. Ong noted that the extensive literature undertaken as part of the “Inside the Double Bind” study found that between 1970 and 2008, there were only 116 pieces of empirical research on women of color in STEM that had been produced, many of which were unpublished. This relatively small body of literature is not nearly enough to understand the experiences of women of color in STEM disciplines and the barriers that limit their progress. Over the last several years, Dr. Ong and her colleagues have worked with several authors of unpublished studies to help them publish their research on women of color in STEM, yet more social scientific research on women of color in STEM needs to be done. Dr. Ong suggested that one way to support this research is through the National Science Foundation’s Science of Broadening Participation initiative.

At the departmental and institutional levels, policies that address work-life balance issues can increase the retention of women faculty of color and help them advance. In the current research project she is conducting with Dr. April Hodari, “Beyond the Double Bind: Women of Color in Science, Technology, Engineering, and Mathematics,” Dr. Ong has found that women of color have nearly 100 percent participation in STEM-related volunteer work, which includes activities such as mentoring undergraduate students of color and serving as role models and on

**“Recruitment is good and critical mass is better, but retention and advancement are key to promoting women of color, especially in faculty positions.”**

**outside activities should be recognized as part of a good career-life balance and should be encouraged or at least understood. Flexible workplaces for women faculty of color in STEM are integral to their retention.**

national boards. Previous scholars have noted that women faculty of color in STEM often face high demands to perform service roles that can hinder their career advancement, since many institutions do not value or reward such service (Malcom and Malcom 2011; Turner 2002). Dr. Ong suggested that to address this barrier, departments and institutions can recognize and reward this work when making decisions about tenure and promotions. This would require those involved in the decision-making process to talk with women about the totality of their work so that those with influence over promotions understand the magnitude and value of their contributions.

Those who face high service demands—and heavy workloads in general—may risk burnout. Dr. Ong said that “women of color stay in science if they can get out of science,” meaning that those who take breaks are more likely to stay in the field. When asked what allowed them to get their doctorate and stay in their career, many women of color point to experiences such as going abroad to do research, taking a long vacation, getting involved in a church, or participating in activism. Dr. Ong recommends that outside activities should be recognized as part of a good career-life balance and should be encouraged or at least understood (Ko et al. 2012).

Flexible workplaces for women faculty of color in STEM are integral to their retention. Dr. Ong suggested that department heads and other institutional leaders ask individual faculty members in their departments about what arrangements they need to lead both successful personal and work lives (Ko et al. 2012). They can use this information to reinforce existing work-life balance policies or establish new policies that make it easier for scientists to lead healthy lives both outside of and in their careers. Although these policies may be especially important for women of color, there exists virtually no empirical research on work-life balance issues for women of color in STEM, suggesting that this remains “a wide open field.” Dr. Ong and Dr. Apriel Hodari’s current research strives to help fill this gap.

Dr. Ong closed with a few words about the 2009 Mini-Symposium on Women of Color in STEM that was requested by the Committee on Equal Opportunities in Science and Engineering (CEOSE), a congressionally mandated committee to advise the National Science Foundation. She pointed out that several recommendations emerged from this convening and were presented by CEOSE to the NSF director and Congress. These recommendations include investing in developing the leadership skills of women of color in STEM, funding research evaluations and practices targeting key transition points (such as postdoctorate and early career phases), and funding workshops and travel awards that enable women of color scientists to network with and mentor each other. More work needs to be done to implement these recommendations; for example, Dr. Ong said that in her experience many women of color find that convenings such as “Accelerating Change” and the 2009 Mini-Symposium on Women of Color in STEM are extremely powerful, yet there are not enough of these gatherings to develop a sustained network that could provide continued knowledge-sharing and an ongoing source of support. Forming more networks involving ongoing communication would be a valuable resource for women faculty of color in STEM.



**KELLY MACK, PH.D.**

*Executive Director, Project Kaleidoscope, Association of American Colleges and Universities*

Dr. Mack shared information about the Society of STEM Women of Color Conclave<sup>®</sup>, an initiative that started with funding from the National Science Foundation. Currently in its fourth year, the conclave brings together approximately 150 women of color in STEM academic disciplines on an annual basis. Two of the conclave's goals are to discuss how the societal pressures that women of color disproportionately experience affect women faculty of color in STEM and to expose participants to the social science research related to the intersection of race and gender. The latter has been the most highly acclaimed part of the Conclave's work because it allows women faculty of color in STEM who are not social scientists the opportunity to gain social science literacy and describe their experiences in ways that social scientists can understand and use for qualitative analysis.

Dr. Mack presented data on the socioeconomic and health status of women of color that members of the Conclave have found quite striking. Using data from the National Science Foundation (2013a), she began with the marital and parental status of women of color employed as scientists and engineers. In these fields, black and Hispanic women are less likely (while American Indian/Alaska Native women are slightly more likely) than white women to be married.<sup>22</sup> Black, Hispanic, and American Indian/Alaska Native women in these occupations are also more likely than white women to have children. Dr. Mack acknowledged that these data may conjure up certain negative images of women of color but stressed the importance of understanding the life circumstances of women of color for developing institutional policies and practices that support their recruitment and retention in STEM.

Drawing on Mariko Chang's analysis of 2004 data from the Survey of Consumer Finances (Chang 2010), Dr. Mack also presented data on the gender and racial wealth gaps in America's economy, noting that these gaps affect women of color in STEM academic disciplines, as well as in other sectors. The data show that for all racial and ethnic groups, single (not married or cohabitating) women have much lower levels of accumulated wealth—which includes retirement accounts, cars, homes, bank accounts, and more—than their male counterparts and married couples. The median wealth for single white women aged 18–64 is \$24,600, which is less than half the median wealth of single white men of this age range (\$53,500). Among single women who identify as Asian American or with "other racial groups," median wealth is \$9,100 compared with \$17,300 for their male counterparts. The median wealth for single black women is \$2,180, which is less than half the median wealth for single black men (\$5,250). The median wealth for single Hispanic women and men is just \$0 and \$1,700, respectively. For each racial and ethnic group,

**"It's important that we understand the whole picture and begin to acknowledge that we're not excluded from, and we're not precluded from, societal imbalances and disparities just because we have the Ph.D."**

<sup>22</sup> Data on Asian Americans were not presented. Whites, blacks, and American Indians/Alaska Natives refer to persons who are not of Hispanic origin. Those who identify as Hispanic may be of any race.

median wealth is much higher for married or cohabiting couples than for households headed by single women and men. These figures, Dr. Mack noted, are critical to understanding the pressures that affect women of color and the quality of their lives, especially in places such as the STEM academy where their representation is low and resources to support them are limited.

Women faculty of color in STEM are also not precluded from experiencing health conditions that disproportionately burden women of color in the general population. Dr. Mack presented data showing that the obesity rate among black, American Indian, and Hispanic women aged 18–64 in the United States is considerably higher than that of white women, while the obesity rate for Asian American women is much lower than the rate for white women (James et al. 2009).<sup>23</sup> Black and Hispanic women and girls aged 13 and older also have much higher rates of new AIDS cases than their white and Asian American counterparts, and among women of all ages blacks have the highest age-adjusted cancer mortality rate (189.3 per 100,000), followed by whites (161.4 per 100,000), American Indians/Alaska Natives (112.0 per 100,000), Hispanics (106.7 per 100,000), and Asian Americans (96.7 per 100,000; James et al. 2009). In general, Dr. Mack said, black, Hispanic, and American Indian/Alaska Native women are substantially more likely than their white and Asian American counterparts to report fair or poor health.

Research has linked poor employee health to lower productivity (Adler et al. 2006; Burton et al. 2005; Stewart et al. 2003). As a result, some industries have implemented policies to promote good health and well-being among employees, as well as safety among clients. For instance, the Federal Aviation Administration has taken steps to ensure that pilots have adequate opportunity to rest before their flights to protect the lives of passengers (U.S. Department of Transportation 2011). Similarly, in the medical profession, the number of duty hours per shift for medical residents are limited to ensure that they remain able to provide safe care (ACGME 2011). Dr. Mack observed that the physical well-being of faculty members, however, continues to be overlooked and suggested that institutions take a holistic approach toward developing policies and practices to support faculty members, particularly women of color.

## Discussion

Following the presentations on existing and new policies that can help advance the status of women faculty of color in STEM, participants discussed three targeted questions in small groups:

1. Of the many institutional policies that can help increase the representation of women of color in STEM faculty positions, which are most important for accelerating progress?
2. What state and federal policies would be most helpful in enabling women of color to pursue and advance in STEM academic careers?

<sup>23</sup> Asian Americans here include Native Hawaiians and other Pacific Islanders.



3. What barriers are most likely to surface when implementing proposed policy changes, and what are some possible strategies for overcoming them?

Participants were asked to imagine that their small group was charged with the task of making three recommendations to the Committee on Equal Opportunities in Science and Engineering. They were also asked to identify actions to help put in place the systems, funding, and programs and/or policies that will support women faculty of color in STEM disciplines. After spending 20 minutes in their small groups, participants relayed the highlights of their conversations to the full group in a discussion led by the convening facilitator. The group's central recommendations, organized by different target audiences, are described below:

## Advocacy Recommendations

- *Increase access to information and raise awareness about the status of women faculty of color in STEM.* Making information about the status of women of color in STEM more easily accessible could increase commitment to accelerating change and to addressing factors that slow progress in diversifying these fields. One approach to accomplishing this goal involves developing a web portal or clearinghouse of data and information on the status of women in STEM. The website would include information of interest to a range of audiences, such as applied researchers, academics, administrators, policymakers, employers, the media, and the general public. In addition to including research reports and articles, data, tools, and policy analysis, the web portal could highlight funding and other opportunities for women faculty of color in STEM.
- *Develop a national standard for valuing the volunteer and service work that many faculty members perform.* As noted, women faculty of color face high demands to perform service roles that college and university tenure and promotion committees often do not recognize or reward. While faculty members' service contributions may be difficult to quantify, improved standards and metrics would help to ensure that the full range and quantity of service activities factor into decisions about tenure and promotion.
- *Develop metrics for monitoring and publicizing individual institutions' progress on diversity in STEM, such as a scorecard system.* A scorecard to report and track institutions' performance on the gender and racial/ethnic diversity of their STEM faculty would help institutions set goals and recognize benchmarks of progress. It would also create an incentive for improvement by making institutional performance transparent. In addition, the reports could highlight practices that work well and spotlight women faculty of color whose teaching and research have made a significant impact.

## Recommendations for Improving Funding Opportunities

- *Structure funding opportunities to increase the visibility and prestige of women faculty of color.* Some participants suggested that foundations establish prestigious grant programs for junior women faculty of color; such grants would help ensure that the scientific contributions of women of color are made visible

and open up new sources of support that would help them advance in academia. Other participants suggested conducting analysis of the distribution of institutional support and funding, including for research assistants (who typically work year-round) and teaching assistants (who generally work more hours, but only during the academic year). Having information about the distribution of institutional funding, support, and resource allocations would help institutions disparities that might ultimately affect faculty retention.

- *Create programs that directly support women faculty of color in STEM and help them to build assets and attain financial security.* Women and people of color traditionally have had fewer financial assets available to them, and their limited access to wealth can make it difficult to persist in STEM academic careers, which yield lower earnings overall than STEM careers in industry and government (National Science Foundation 2012). Programs to help women faculty of color build assets over time—such as through assistance with student loan payments or contributions to down payments for a mortgage, or to child care costs—could enable more women of color to stay in academic positions and advance through the ranks.
- *Provide greater transparency about the gender and racial/ethnic background of those who apply for and receive federal grants.* Information about the race and gender characteristics of federal funding applicants and recipients is not readily available. This information could shed light on the equitability of funding decisions that affect advancement opportunities and recognition. It could provide insight into whether new practices are needed to ensure equity in the allocation of funds and, if so, which demographic groups these practices should target.

## Recommendations for Improving Institutional Practices

- *Develop institutional leadership that values diversity.* High-level leaders who value diversity are crucial in ensuring that educational institutions implement policies and practices to address gender and race disparities in faculty representation, support, and promotions. For example, such leaders can require search committees to conduct comprehensive and inclusive searches resulting in candidate pools that more fully represent the talent available. When academic institutions choose leaders who understand the challenges women faculty of color face and seek to address them, it sends a message to the whole community that inclusion is a high priority.
- *Require diverse search committees for new faculty hires.* Having diverse committees can help ensure that wide pools of candidates are considered for open positions. For institutions with few faculty members of color, however, creating diverse search committees can be difficult, since the faculty of color must serve on most or all committees for diversity to be achieved. One participant suggested that colleges and universities allow their alumni to serve on search committees in order to increase the pool of potential committee members of color.
- *Ensure that hiring policies require that those being hired can demonstrate cultural competence.* Participants said that for line management positions in

particular, committees often simply either hire “who they know” or prioritize technical accomplishments when evaluating candidates. Yet, many people with solid technical accomplishments do not make good managers. For this reason, it is essential that committees consider only candidates with demonstrated cultural competency and a track record that shows they can successfully support the careers of all people. “We need to close the institutional back doors,” one participant commented. “And if [culturally incompetent managers] got in there in the first place, we need to get them out!”

- *Change the academic work climate to improve conditions for women faculty of color in STEM.* These changes could include offering more sabbaticals targeted for women of color in STEM and strengthening policies that support career-life balance. Several participants noted that workplace climate policies need to be put into cultural context. For example, specific cultural issues may affect the experiences of women faculty of color in STEM, such as their greater likelihood of having extended family responsibilities. Taking such issues into account, and educating tenure and promotion committees about their impact on the lives of women of color, will help ensure that the policies in place do not put women of color at a disadvantage.
- *Encourage contextualized mentoring plans.* While mentoring in general may be useful for new faculty members in STEM, contextualized mentoring—which takes into account the specific challenges that women of color in STEM disciplines face—can give women of color, in particular, the support and guidance they need to stay in the field and advance through the ranks. This mentoring could prove useful not only for professors but also for graduate students and postdoctoral fellows, who represent potential future STEM faculty.
- *Implement regular, transparent salary reviews.* Instituting regular salary reviews can give department heads and other key administrators an opportunity to identify pay discrepancies. They can also give faculty members a chance to have the criteria for increased pay and promotions put on record, making it more likely that these criteria will be understood and met.



# Looking to the Future / Putting Recommendations into Action



**CARMEN CID, PH.D.**  
*Interim President, Quinebaug Valley Community College*

The final session synthesized the insights from the day to highlight key areas of potential transformation and strategies for implementing change. To start the discussion, Dr. Carmen Cid, of Quinebaug Valley Community College, summarized the day's conversations, emphasizing the importance of distilling the presentations and discussions into a manageable action plan with short- and long-term steps. She recapped changes suggested throughout the day, such as fostering cross-institutional collaborations to improve the circumstances of women faculty of color in STEM; creating a peer network and social space for women faculty of color that can help them deal with the experiences of being "outliers," "pets," or "threats" in their academic communities; promoting policies and practices that affirm the importance of work-life balance for academic scientists; and making significant funding available to address the needs of women faculty of color in STEM. In pursuing these goals, Dr. Cid noted, it is important to acknowledge progress already made and identify programs to build upon and expand so that efforts are not duplicated or energy wasted where success has been achieved. "There are many good examples of programs for women of color in STEM that we can replicate," she said. "We need to connect the wheels already in motion to some major hub."

## Discussion

Following Dr. Cid's remarks, convening participants prioritized the suggested strategies for action identified at the end of session three. As conference facilitator Heather Berthoud said, "Generating ideas is great, but there is a transition from generating ideas to enacting them." To prioritize the strategies, participants voted

**"We need more convenings because we desperately need to validate that we are not outliers.... And we need to expand national agencies' support for the infrastructures that move these recommendations forward."**

on the idea(s) for which they had the most energy for taking action. Once the votes were tallied, the conference organizers identified the five top priorities—in a few instances combining several related ideas into one—and assigned each idea to a roundtable in the room. Participants then moved to the table associated with the action they most wanted to discuss. They worked together at these tables to articulate action steps for implementing the designated strategies by considering the question: What might be done to bring these ideas to fruition? The suggested action steps for four of the five ideas are discussed below; no participants chose to discuss the fifth recommendation.

## Action Steps for Priority Recommendations:

1. *Increase the accessibility of information and raise awareness about the status of women faculty of color in STEM.* Participants suggested that a first step to establishing a web portal on women faculty of color in STEM would be to select a reputable research organization or institute to design, with grant funding, a template to display the information. The template or portal within the website should appeal to a variety of users (e.g., university professors and students, government officials, the general public) and should host publications with relevant data, as well as findings from new analysis of existing data conducted by those who host and maintain the portal. In addition, participants noted that grant funds could include support to collect new data from professional societies and other sources that would further illuminate the experiences and circumstances of women faculty of color in STEM. Discussants also proposed creating interactive tools for the web portal so that users could create data tables.
2. *Develop metrics for monitoring and publicizing individual institutions' progress on diversity in STEM, such as a scorecard system.* Participants envisioned a process in which an organization or individual evaluates colleges and universities on their performance on issues of faculty diversity, particularly among women. The report could assign letter grades to the schools and profile success stories of specific academic departments or of women of color who have been nominated for awards on an institutional or individual level. It could also examine the number of women of color who have submitted grant proposals and received awards from the National Science Foundation; while these data are not disaggregated by gender and race/ethnicity in NSF's annual merit review process report (National Science Foundation 2013b), researchers could potentially obtain disaggregated data by working with higher education institutions. The scorecard would rank best colleges and universities for women of color in STEM and identify female leaders or mentors of color in these fields.
3. *Provide greater transparency in who applies for and receives federal grants.* Participants looked at the National Science Foundation's most recent merit review report (2013b) and noticed that while the report provides data on the number of women who submit proposals to NSF and receive funding, as well as on the number of minorities who do so, it does not provide data for minority women. Participants suggested that it would help to have this information, if not by discipline (which likely would not be possible due to small cell sizes), then by NSF directorate. According to the most recent merit review report, minorities submit less than 10 percent of proposals to NSF, a statistic that prompted one participant

**“Generating ideas is great, but there is a transition from generating ideas to enacting them.”**

to ask, "Why so few?" Participants suggested that someone explore this issue in a policy brief or white paper.

4. *Encourage contextualized mentoring plans.* Participants said that it is important for institutions to pay attention to how they "do mentoring." What strategies do they use to ensure that senior faculty members who mentor their less experienced female colleagues of color are effective in this role? Participants suggested developing tools colleges and universities can use to orient mentors and mentees to the process and to evaluate their mentoring programs; few tools currently focus on mentoring women faculty of color in STEM. Participants cautioned, however, that mentoring programs are just one of many interventions that colleges and universities must pursue to diversify their workforce, and should not be viewed as singular solution for improving the representation of women of color in STEM faculty positions.
5. *Develop institutional leadership that values diversity and ensure that hiring policies require that those being hired can demonstrate cultural competence.*





# Closing Remarks / Carrying the Momentum Forward



**GERTRUDE FRASER, PH.D.**  
*Vice Provost for Faculty Recruitment and Retention, University of Virginia*



**BARBARA GAULT, PH.D.**  
*Vice President and Executive Director, Institute for Women's Policy Research*

Dr. Fraser began her remarks by noting that discourse—how people say what they say—affects and shapes actions to bring about change in the world. She identified two terms used in the day's discussions that may have especially important implications for action strategies to increase the representation of women faculty of color in STEM. The first is the notion of "fortifying" women of color in STEM. The term "fortifying," Dr. Fraser pointed out, has connotations of strengthening, supporting, encouraging, and creating more strength in women of color. In her view, since it has more of an "energetic emphasis" than "mentoring," the language of "fortifying" should be used more often than it currently is to underscore that women of color in STEM have gifts that simply need to be built up.

Second, Dr. Fraser spoke about "safe havens," which she defined as places where women of color can be "their authentic selves," have new ideas, and imagine strategies they might implement. She noted that "good things come out of safe havens that have a material impact on the world." In particular, safe havens provide a context where people can reflect not only on the "bad news" (the barriers they face

**Women faculty of color in STEM "know how to work in adversity, how to persist, and how to maintain optimism." These are very powerful skills that enable women of color to persist and survive. They are also skills that are critical to succeeding as scientists.**

**“Now that we’ve reached the end of the day, I want to thank all of you for your hard work—including the speakers who put so much thought into the preparation and who shared their wisdom and humor and very personal stories...I hope we can continue to work together.”**

in achieving their goals) but also on the positive effects of their work and strategies for progress that have proved successful. Safe havens, Dr. Fraser cautioned, can only be safe if they do not exclude people or cause particular individuals to feel they are not quite “in.” For example, a conference about women faculty of color in STEM cannot be a safe haven for many women if anti-immigrant language is used. Dr. Fraser emphasized the need to develop language that describes strategies for building the participation of domestic American minorities without invoking the rhetoric of “keeping immigrants out.”

In her remarks on discourse and language, Dr. Fraser also pointed to the power of “reframing” as a strategy for transformation and revolutionary change. This reframing, she said, needs to involve understanding the experiences of women faculty of color in STEM as reflecting not only oppressive structures and practices but also the inherent strength and power of women of color. Women faculty of color in STEM “know how to work in adversity, how to persist, and how to maintain optimism.” These are very powerful skills that enable women of color to persist and survive. They are also skills that are critical to succeeding as scientists—scientists, too, must know how “to redirect, how to fail, and how to pick themselves up” when their research does not yield the results they had hoped for or expected.

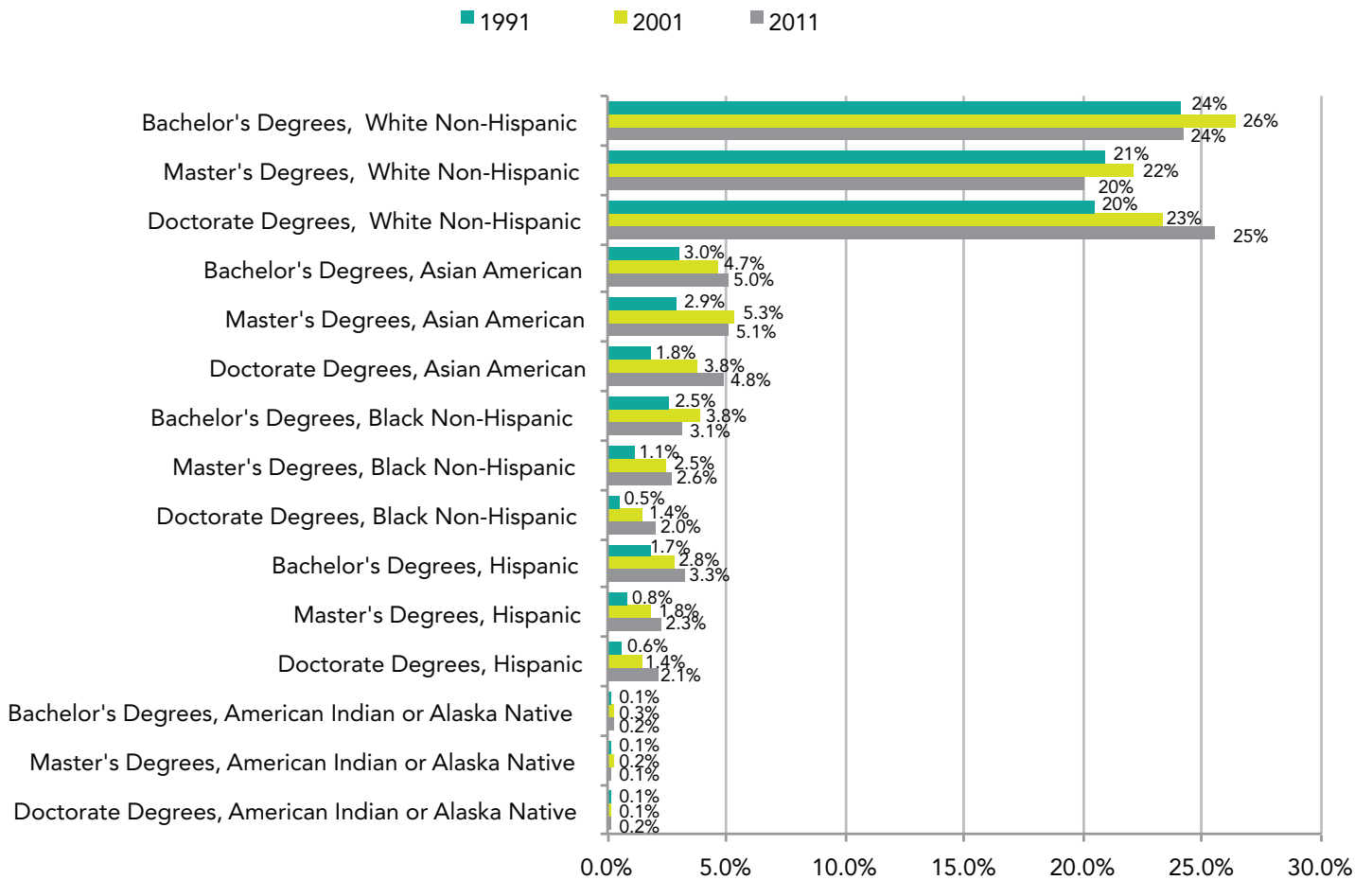
Dr. Fraser concluded with a few words about what she calls “foundational schemas.” The term “foundational schema,” she said, refers to language that describes a common experience in a new way, giving people a framework for understanding more clearly certain aspects of their lives. As the power of these new frameworks become apparent, she said, “a foundational schema is emerging.” As one example, Dr. Fraser pointed to the discussion about the “pet or threat” phenomenon earlier in the day—a discussion that resonated deeply with many people in the room. According to Dr. Fraser, more qualitative research is needed to bring foundational schemas such as this one to the surface and to understand the subtlety of experiences that these schemas describe.

Dr. Gault ended the session with some remarks about next steps following the convening. She spoke about IWPR’s plan to create a report that pulls together information from the presentations and the participants’ suggested strategies for action. She also said that IWPR hopes to use social media and blogging to disseminate findings from the conference and will seek resources, in partnership with convening attendees, to pursue some of the recommended strategies for change. She concluded by thanking the speakers for their wisdom, humor, and careful preparation and for sharing their personal stories.

# Appendix A

## Figures and Tables by Gender, Race/Ethnicity, and STEM Discipline

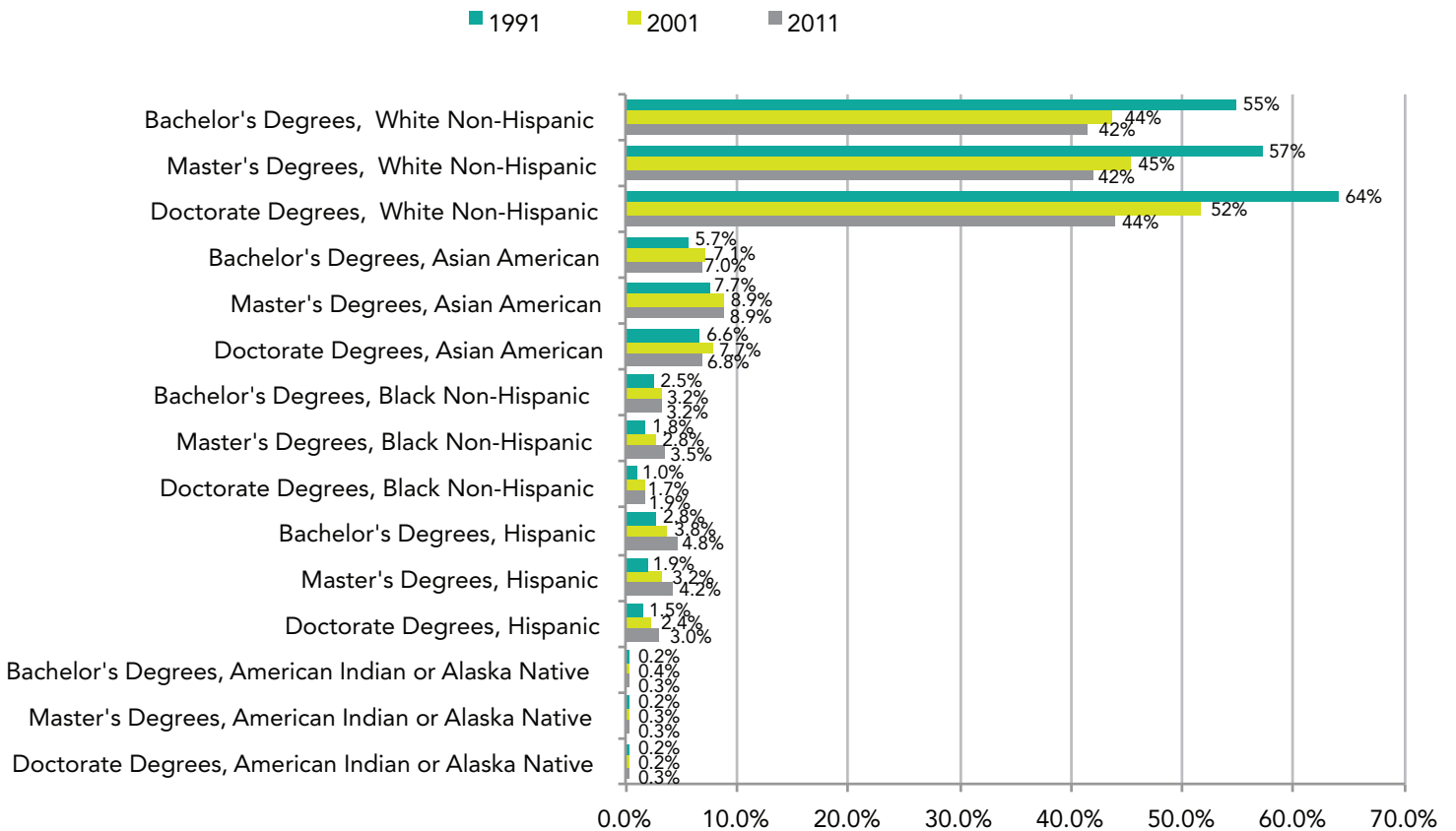
**Figure A1 / Percent of All STEM Degrees Awarded to Women by Race/Ethnicity and Degree in 1991, 2001, and 2011**



Notes: STEM here includes the agricultural sciences; biological sciences; computer sciences; atmospheric sciences, earth sciences, and oceanography; mathematics and statistics; physical sciences; and engineering. "Women of color" here refers to those who identify as black (non-Hispanic), Hispanic, Asian American or Pacific Islander, and American Indian/Alaska Native. Figures include only those who are U.S. citizens and permanent residents.

Source: IWPR analysis of data from the IPEDS Completions Survey by Race (U.S. Department of Education 2013).

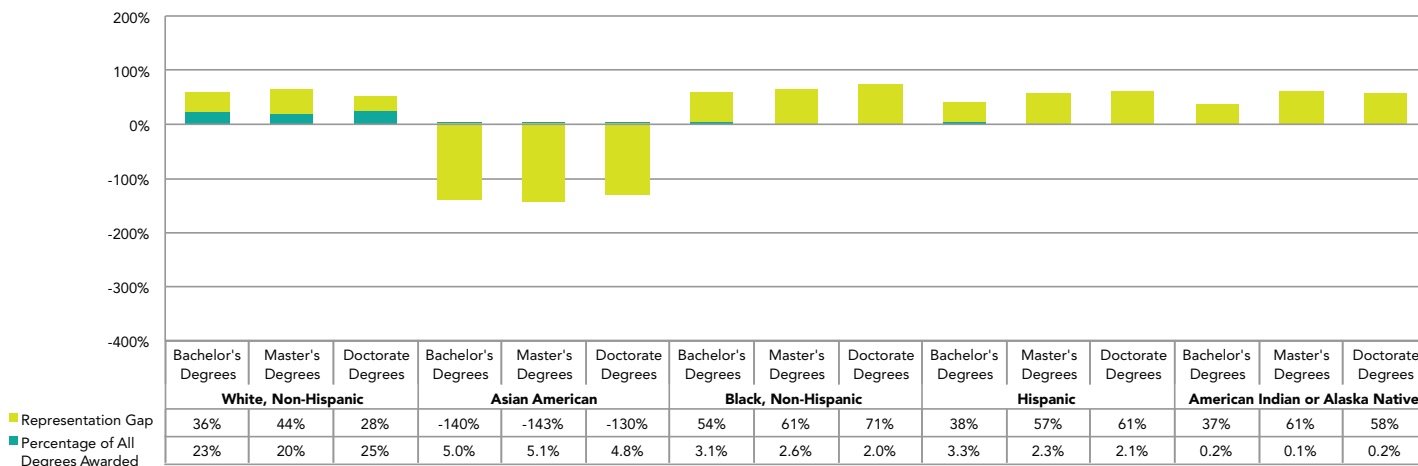
**Figure A2 / Percent of All STEM Degrees Awarded to Men by Race/Ethnicity and Degree in 1991, 2001, and 2011**



Notes: STEM here includes the agricultural sciences; biological sciences; computer sciences; atmospheric sciences, earth sciences, and oceanography; mathematics and statistics; physical sciences; and engineering. "Women of color" here refers to those who identify as black (non-Hispanic), Hispanic, Asian American or Pacific Islander, and American Indian/Alaska Native. Figures include only those who are U.S. citizens and permanent residents.

Source: IWPR analysis of data from the IPEDS Completions Survey by Race (U.S. Department of Education 2013).

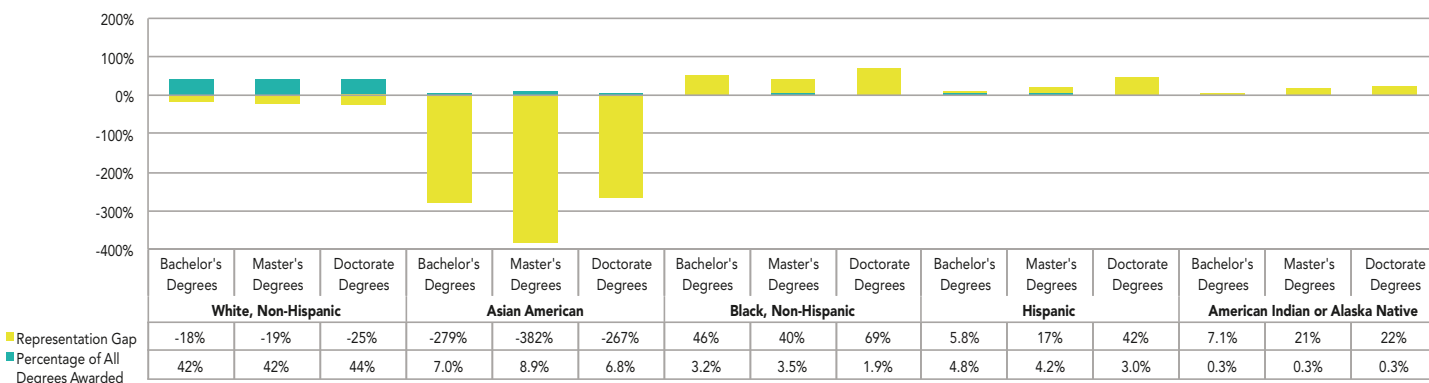
**Figure A3 / Percent of All STEM Degrees Awarded to Women and Representation Gap by Race/Ethnicity and Degree, 2011**



Notes: STEM here includes the agricultural sciences; biological sciences; computer sciences; atmospheric sciences, earth sciences, and oceanography; mathematics and statistics; physical sciences; and engineering. Figures include only those who are U.S. citizens and permanent residents. The representation gap is the increase needed to reach full representation in STEM in relation to representation in the total population.

Source: IWPR analysis of data from the IPEDS Completions Survey by Race (U.S. Department of Education 2013).

**Figure A4 / Percent of All STEM Degrees Awarded to Men and Representation Gap by Race/Ethnicity and Degree, 2011**



Notes: STEM here includes the agricultural sciences; biological sciences; computer sciences; atmospheric sciences, earth sciences, and oceanography; mathematics and statistics; physical sciences; and engineering. Figures include only those who are U.S. citizens and permanent residents. The representation gap is the increase needed to reach full representation in STEM in relation to representation in the total population.

Source: IWPR analysis of data from the IPEDS Completions Survey by Race (U.S. Department of Education 2013).

**Table A1 / Number and Percent of Women and Men Employed as Faculty at Colleges, Universities, and Affiliated Centers and Institutes, by Race/Ethnicity and STEM Discipline, 1993 and 2010**

		All STEM Disciplines				Biological, Agricultural, and Other Life Sciences				Computer and Mathematical Sciences				Engineering				Physical and Related Sciences			
		1993		2010		1993		2010		1993		2010		1993		2010		1993		2010	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Women	White	9,900	11%	19,800	18%	6,200	17%	10,800	24%	1,400	8.5%	2,900	14%	700	4.2%	1,700	8.3%	1,600	7.8%	4,400	17%
	Asian American	1,200	1.3%	4,100	3.7%	400	1.1%	1,700	3.9%	400	2.4%	1,000	4.8%	100	0.6%	800	3.9%	300	1.5%	600	2.3%
	Underrepresented Minority	500	0.6%	2,300	2.1%	300	0.8%	1,100	2.5%	*	*	300	1.4%	*	*	400	2.0%	200	1.0%	500	1.9%
Men	White	68,300	75%	65,100	58%	27,400	73%	24,300	55%	12,200	74%	11,900	57%	12,300	75%	11,800	58%	16,400	80%	17,100	65%
	Asian American	7,600	8.4%	13,800	12%	2,100	5.6%	3,400	7.7%	1,700	10%	3,800	18%	2,700	16%	4,400	22%	1,100	5.4%	2,200	8.4%
	Underrepresented Minority	3,200	3.5%	6,700	6.0%	900	2.4%	2,800	6.3%	800	4.8%	1,100	5.2%	700	4.2%	1,300	6.4%	800	3.9%	1,500	5.7%
<b>Total</b>		<b>90,700</b>		<b>111,800</b>		<b>37,300</b>	<b>100%</b>	<b>44,100</b>	<b>100%</b>	<b>N/A</b>	<b>100%</b>	<b>21,000</b>	<b>100%</b>	<b>N/A</b>	<b>100%</b>	<b>20,400</b>	<b>100%</b>	<b>20,400</b>	<b>100%</b>	<b>26,300</b>	<b>100%</b>

Notes: Numbers are rounded to the nearest 100. N/A indicates that data are not available. Faculty include assistant, associate, and full professors. Whites and Asian Americans refer to persons who are not of Hispanic origin. "Underrepresented minorities" includes blacks, Hispanics, American Indians/Alaska Natives, Native Hawaiians/Other Pacific Islanders, and (in 2010) those reporting more than one racial category. Prior to 2003 respondents to the survey were asked to report only one race. Figures include faculty at four-year colleges or universities, medical schools (including university-affiliated hospitals or medical centers), and university-affiliated research institutes who are U.S. citizens or permanent residents. \* = value < 50.

Source: IWPR analysis of special tabulations of data from the National Center for Science and Engineering Statistics' 2010 Survey of Doctorate Recipients provided by the National Science Foundation.





# Appendix B

## Advisory Committee

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# Appendix C

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# Appendix D

## Convening Agenda

### Goals:

- To identify promising policy and programmatic changes for increasing the representation of women faculty of color in STEM disciplines
- To define areas for action for different audiences invested in accelerating the progress of women faculty of color in STEM
- To develop new relationships among individuals and organizations committed to the advancement of women of color in STEM academic careers

### Continental Breakfast (8:15–8:45 a.m.)

### Welcome and Introductions (8:45–9:05 a.m.)

### Opening Remarks:

Heidi Hartmann, Ph.D.

*President, Institute for Women's Policy Research*

Kelly Mack, Ph.D.

*Executive Director, Project Kaleidoscope, Association of American Colleges and Universities*

### Session 1: Framing the Issues: The Current State of Women Faculty of Color in STEM (9:05–10:45 a.m.)

This session will offer a broad-based perspective on the current state of women faculty of color in STEM and present data that illuminate areas where progress has been made, as well as where and why it has stalled.

*Moderator:*

Jong-on Hahm, Ph.D.

*Program Manager, Europe and Eurasia, Office of International and Integrative Activities, National Science Foundation*

*Speakers:*

Lorelle Espinosa, Ph.D.

*Senior Analyst, Abt Associates*

Kecia Thomas, Ph.D.

*Professor of Industrial-Organizational Psychology and Senior Advisor to the Dean for Inclusion and Diversity Leadership, University of Georgia*

Shirley Malcom, Ph.D.

*Head, Directorate for Education and Human Resources Programs, American Association for the Advancement of Science*

*Discussion:*

1. Is there additional background information that we should consider on either the status of women faculty of color in STEM or remaining challenges that hinder their progress?
2. What promising trends in overcoming these challenges are you aware of?
3. What accounts for their success?

### Break (10:45–11:00 a.m.)

### Session 2: Breaking Barriers, Building Bridges: Promising Practices to Increase the Representation of Women Faculty of Color in STEM (11:00 a.m.–12:30 p.m.)

This session will include speakers involved in current initiatives to increase the representation of women of color in STEM faculty positions. It will highlight successful strategies and lessons learned from these initiatives to open up a discussion about how to implement and expand promising models in various institutional contexts.

*Moderator:*

**Christine Grant, Ph.D.**

*Associate Dean for Faculty Development and Special Initiatives, College of Engineering, and Professor of Chemical and Biomolecular Engineering, North Carolina State University*

*Speakers:*

**Marigold Linton, Ph.D.**

*Director, American Indian Outreach, University of Kansas*

**Anny Morrobel-Sosa, Ph.D.**

*Provost and Senior Vice President for Academic Affairs, Lehman College*

*Discussion:*

1. If you could take one or two promising programs for increasing the representation of women of color in STEM faculty positions to scale, what would they be?
2. What are some strategies for taking existing promising models to scale?
3. What key programmatic shifts need to be made to promote the advancement of women of color in STEM disciplines?

### Luncheon Keynote (12:30–1:30 p.m.)

*Speaker:*

**Steve Robinson, Ph.D.**

*Special Assistant, White House Domestic Policy Council*

### Session 3: Policy and Progress: Expanding Opportunities for Women Faculty of Color in STEM (1:30–3:00 p.m.)

This session will focus on existing STEM-related policies as well as policy changes needed to help advance the careers of women faculty of color in STEM. Institutional, state, and federal policies will be covered.

*Moderator:*

**Wanda Ward, Ph.D.**

*Office Head, Office of Integrative Activities, National Science Foundation*

*Speakers:*

**Kelly Mack, Ph.D.**

*Executive Director, Project Kaleidoscope, Association of American Colleges and Universities*



**Maria (Mia) Ong, Ph.D.**

*Senior Researcher and Evaluator, Education Research Collaborative, TERC*

*Discussion:*

1. Of the many institutional policies that can help increase the representation of women of color in STEM faculty positions, which are most important for accelerating progress?
2. What state and federal policies would be most helpful in enabling women of color to pursue and advance in STEM academic careers?
3. What barriers are likely to surface when implementing proposed policy changes, and what are some possible strategies for overcoming them?

### Break (3:00–3:15 p.m.)

### Session 4: Discussion: Looking to the Future: Putting Recommendations into Action (3:15–4:45 p.m.)

This session will draw on insights from the day to explore key areas of potential change (e.g., policy, institutions, philanthropy) and steps that can be taken within these areas to increase the representation of women of color in STEM faculty positions. The session will encourage the active participation of all attendees.

*Moderator:*

**Heather Berthoud, M.S.**

*Organizational Development Consultant, Berthoud Consulting*

*Speaker:*

**Carmen Cid, Ph.D.**

*Interim President, Quinebaug Valley Community College*

*Discussion:*

1. Who are the key levers of change, and to what degree are they currently being reached?
2. What are some movement-building strategies that can be implemented? Which strategies can be implemented now, and which are long-term goals?
3. Are there ways for this group to continue working together to create change?
4. What approaches to change are you most interested in pursuing?

### Closing Remarks (4:45–5:00 p.m.)

**Gertrude Fraser, Ph.D.**

*Vice Provost for Faculty Recruitment and Retention, University of Virginia*

**Barbara Gault, Ph.D.**

*Executive Director and Vice President, Institute for Women's Policy Research*

### Social Time (5:00–6:00 p.m.)



## Appendix E

### Speaker Biographies

#### **Heather Berthoud, M.S.**

*Organizational Development Consultant, Berthoud Consulting*

*Learning Community Facilitator, Practicum Advisor, and Adjunct Professorial Lecturer at American University*

Heather Berthoud, facilitator for “Accelerating Change for Women Faculty of Color in STEM: Policy, Action, and Collaboration,” has 25 years of experience in organization effectiveness, combining a passion for social justice with practical results-focused approaches to improving leaders’ and organizations’ ability to accomplish their social change goals. She uses astute listening and synthesis skills to bring coherence and clarity to seemingly unrelated matters, identifying the essence of issues to construct models and perspectives that clients can apply in their own situations. Through her work with Berthoud Consulting, Ms. Berthoud has worked with Advocates for Youth, the American Federation of State County and Municipal Employees (AFSCME), the Center for Community Change, NARAL Prochoice America, and the Save Darfur Coalition, among others. Prior to her consulting practice, she worked on organizational development and curriculum design, grassroots mobilization, and workshops on planning, diversity, and leadership. Ms. Berthoud has authored several publications on diversity, planning, training, and consulting. Her most recent publication, coauthored with a client, is “Diversity Initiative in a Social Change Organization: A Case Study” in the TAMARA JOURNAL for Critical Organization Inquiry (2010). She is a member of NTL Institute, the Organization Development Network, and the Gestalt International Study Center and served on the board of the A.K. Rice Institute for the Study of Social Systems. She has a B.S. in biology from the University of Pennsylvania and an M.S. in organization development from American University.

#### **Carmen Cid, Ph.D.**

*Interim President, Quinebaug Valley Community College*

Carmen Cid is Professor of Biology and Dean of the School of Arts and Sciences at Eastern Connecticut State University. She has many years of experience in higher education as Professor of Ecology, Biology Department Chair, and Dean and has received various awards for her work to improve representation and career development for women and minorities in biology and ecology. Dr. Cid started the Women and Minorities Committee of the Ecological Society of America in 1991 and helped develop the first education and human resources strategic plan for ESA (Women and Minorities in Education Report I). She has continued her work in ecology education and workforce development as Chair of the Ecological Society of America’s Board of Professional Certification, the Odum Ecology Award Committee, and the K-12 education subcommittee for the National Ecological Observatory Network (NEON) NSF-funded project. Joining the Council of Colleges of Arts and Sciences (CCAS) in 2005, and now on the CCAS Board of Directors, she helped start the Cultural Diversity Committee and served as co-chair for three years, developing career enhancement programming for deans, including the online CCAS web tool “Dean’s Knowledge Base.” She is Co-Principal Investigator to the CCAS NSF-ADVANCE grant to infuse gender equity training in mentoring programs for department chairs and deans, to improve recruitment and retention of women faculty, and to enhance leadership training for minority faculty. She works nationally on providing deans with improved access to resources on best practices for faculty-student, collaborative research programs, and on the dean’s role in developing university-wide models of inclusive excellence for students and faculty.

**Lorelle L. Espinosa, Ph.D.**  
*Senior Analyst, Abt Associates*

Lorelle Espinosa is Senior Analyst with Abt Associates, a global policy research and evaluation firm in the Washington, DC area. At Abt, she evaluates the effectiveness of higher education and training programs in STEM disciplines. Dr. Espinosa formerly served as Director of Policy and Strategic Initiatives with the Institute for Higher Education Policy (IHEP) and as MIT's Director of Recruitment and Associate Director of Admissions, where she focused on recruiting, admitting, and enrolling talented undergraduate women and underrepresented minority students into the university's STEM disciplines. Currently, Dr. Espinosa authors a widely read blog for *Diverse: Issues in Higher Education* called "STEM Watch," which addresses the national imperative of building and sustaining a diverse STEM pipeline. She graduated from Santa Barbara City College with an A.A. degree and then earned her B.A. from the University of California-Davis. She went on to complete an M.A. and Ph.D. in Education from the University of California, Los Angeles. With a research background in the advancement of underrepresented minority students in STEM tertiary education, Dr. Espinosa is best known for her work on women of color in STEM.

**Gertrude Fraser, Ph.D.**  
*Vice Provost for Faculty Recruitment and Retention, University of Virginia*

Gertrude Fraser is Vice Provost for Faculty Recruitment and Retention at the University of Virginia in Charlottesville, Virginia. She was a program officer in higher education from 2000 to 2003 at the Ford Foundation, where she spearheaded initiatives on diversity in higher education and interdisciplinary programming in women's and African American studies. From 1998 to 2000, Dr. Fraser was Director of the Undergraduate Program in Anthropology and Associate Professor in the Department of Anthropology and the Carter G. Woodson Institute of African American and African Studies at the University of Virginia. She earned degrees from Bryn Mawr College and The Johns Hopkins University, where she completed her doctorate in anthropology. Dr. Fraser is the author of *African American Midwifery in the South: Dialogues of Birth, Race, and Memory* and has presented to numerous conferences and workshops on diversity and leadership in higher education. Her scholarship and administrative mission are joined in her passion for helping others to tell their stories and identify their strengths within an organization and in their everyday lives.

**Barbara Gault, Ph.D.**  
*Executive Director and Vice President, Institute for Women's Policy Research*

Barbara Gault, Ph.D., is Executive Director and Vice President of the Institute for Women's Policy Research. Since joining the Institute in 1997, she has focused on a wide range of issues of importance to women and their families, including poverty, access to education, health, work-life balance, political engagement, and the need for expanded preschool and child care options for working parents. Her publications include *Improving Child Care Access to Promote Postsecondary Success Among Low-Income Parents*, *Resilient and Reaching for More: Challenges and Benefits of Higher Education for Welfare Participants and Their Children*, *The Price of School Readiness: A Tool for Estimating the Cost of Universal Preschool in the States*, and *Working First but Working Poor: The Need for Education and Training Following Welfare Reform*. She has testified in Congress on low-income women's educational access, has spoken on women's issues in venues throughout the country including at White House-sponsored events, and appears in a range of print, radio, and television media outlets. Prior to joining IWPR, Dr. Gault conducted research at the Office of Children's Health Policy Research and served as a staff and board member of organizations promoting human rights in Latin America. She received her Ph.D. in social psychology from the University of Pennsylvania and her B.A. from the University of Michigan. She serves on the Board of Directors of the Coalition on Human Needs and is Research Professor of Women's Studies at The George Washington University.

**Christine Grant, Ph.D.**

*Associate Dean for Faculty Development and Special Initiatives, College of Engineering, and Professor of Chemical and Biomolecular Engineering, North Carolina State University*

Christine Grant is Associate Dean for Faculty Development and Special Initiatives in the College of Engineering and Professor of Chemical and Biomolecular Engineering at North Carolina State University (NCSU). In her role at NCSU, Dr. Grant oversees programs to build collaboration for faculty professional development in the College of Engineering. She founded and directs the Promoting Underrepresented Presence on Science and Engineering Faculties (PURPOSE) Institute, which seeks to increase the number and success of engineering faculty members from underrepresented groups. She has been recognized for her leadership in mentoring underrepresented minorities in STEM with the NSF Presidential Award for Excellence in Science, Math, and Engineering Mentoring (PAESMEM) and the Council for Chemical Research Diversity Award. She received the 2011 Winifred Burks-Houck Women's Professional Leadership Award for her work and commitment to the success of black chemists and chemical engineers by the National Organization for Professional Advancement of Black Chemists and Chemical Engineers. Her workshops on mentoring and academic career development for NSF ADVANCE programs at Purdue, Cornell, Texas A&M, the University of Toledo, the University of Virginia, Prairie View A&M, the University of New Hampshire, and ADVANCE Annual PI meetings promote STEM faculty development while providing diverse role models for students. One of four African-American women full chemical engineering professors in the country, her research interests are in interfacial phenomena and recently biomedical systems. Dr. Grant received her B.S. in chemical engineering from Brown University and her M.S. and Ph.D. in chemical engineering from the Georgia Institute of Technology.

**Jong-on Hahm, Ph.D.**

*Program Manager, Europe and Eurasia, Office of International and Integrative Activities, National Science Foundation*

Jong-on Hahm is Program Manager at the National Science Foundation's Office of International and Integrative Activities. Prior to joining NSF she was Vice President at the Biotechnology Institute, a nonprofit organization dedicated to outreach and education on biotechnology. Dr. Hahm developed and led Institute initiatives on higher education and the workforce in tandem with the Institute's K-12 programs to improve biotechnology education and training in the United States. She spearheaded the effort to infuse diversity into all aspects of biotechnology and oversaw the Institute's Minority and Indigenous Fellows Program. From 1998 to 2005, Dr. Hahm was Director of the Committee on Women in Science and Engineering of the National Research Council. In this capacity, she worked with the White House Office of Science and Technology Policy and the Congressional Commission on the Advancement of Women, Minorities, and Persons with Disabilities in Science, Engineering, and Technology Development, and led a congressionally mandated study on gender differences in the careers of science, engineering, and mathematics faculty. Dr. Hahm has held research appointments in the Department of Neurosurgery at Georgetown University, the National Cancer Institute, and the National Institute of Mental Health. She earned her Ph.D. in neuroscience from the Massachusetts Institute of Technology and holds an M.A. in psychology from the American University and a B.Sc. in psychology from McGill University.

**Heidi Hartmann, Ph.D.**

*President, Institute for Women's Policy Research*

Heidi Hartmann is President of the Institute for Women's Policy Research (IWPR), a scientific research organization that she founded in 1987 to meet the need for women-centered, policy-oriented research. She is an economist with a B.A. from Swarthmore College and M. Phil and Ph.D. degrees from Yale University, all in economics. Dr. Hartmann is also Research Professor at The George Washington University. She lectures internationally on women, economics, and public policy, frequently testifies before the U.S. Congress, and is often cited as an authority in various media outlets, such as CNN, ABC News, The New York Times, and the NewsHour. Dr. Hartmann has published numerous articles in journals and books, and her work has been translated into more than a dozen languages. She serves as Secretary/Treasurer of the National Council of Women's Organizations and Editor of the Journal of Women, Politics & Policy and has served as the Chair of the Board of the American Academy of Political and Social Science. Prior to founding IWPR, Dr. Hartmann was on the faculties of Rutgers University and the New School for Social Research and

worked at the National Research Council/National Academy of Sciences. In 1994, Dr. Hartmann was the recipient of a MacArthur Fellowship Award for her work in the field of women and economics. She is also the recipient of an honorary Doctor of Laws degree from Swarthmore College, an honorary Doctor of Humanities degree from Claremont Graduate University, the Wilbur Cross Medal for distinguished alumni of the graduate school of Yale University, and the 2012 Women of Vision Award from the National Organization for Women.

**Marigold Linton, Ph.D.**

*Director of American Indian Outreach, University of Kansas*

Marigold Linton is Cahuilla-Cupeno and a member of the Morongo Band of Mission Indians. She is currently Director of American Indian Outreach at the University of Kansas, where she has developed a consortium with Haskell Indian Nations University to support biomedical research opportunities for American Indian students and faculty at both institutions. Prior to her position at the University of Kansas, Dr. Linton taught at San Diego State University, reaching the rank of full professor. She was recruited by the University of Utah as full professor and then served for 12 years as an administrator at Arizona State University. During that time she was Director of American Indian Outreach Programs, serving Arizona tribes through the Rural Systemic Initiative. Dr. Linton is a founder of both the Society for Advancing Hispanics/Chicanos and Native Americans in Science (SACNAS) and the National Indian Education Association (NIEA). She served as President of the SACNAS Board of Directors in 2005 and 2006—the second woman and the second American Indian—and remains on the board as a senior advisor. She has had a number of significant national appointments, including the Committee on Equal Opportunities in Science and Engineering (CEOSE); the NIH National Institutes of General Medical Science, the National Advisory Research Resources Council; the National Research Council, Committee on Assessment for NIH Minority Research/Training Programs, III; and the National Academy of Sciences, Fellowship Office Advisory Committee. Dr. Linton received her B.A. from the University of California, Riverside, and her Ph.D. from UCLA in experimental psychology.

**Kelly Mack, Ph.D.**

*Executive Director, Project Kaleidoscope, Association of American Colleges and Universities*

Kelly Mack is Executive Director of Project Kaleidoscope, a nonprofit organization focusing on undergraduate STEM education reform at the Association of American Colleges and Universities (AAC&U). Prior to joining AAC&U, Dr. Mack was Senior Program Director for the NSF ADVANCE Program while on loan from the University of Maryland Eastern Shore (UMES), where, as Professor of Biology, she taught courses in physiology and endocrinology for 17 years. During her tenure at NSF, Dr. Mack managed an annual budget of approximately \$17 million, facilitated the inclusion of issues targeting women of color into the national discourse on gender equity in the STEM disciplines, and significantly increased the participation of predominantly undergraduate institutions, community colleges, and minority-serving institutions in the ADVANCE portfolio. Dr. Mack also served as Principal Investigator, Director, or Co-Director for externally funded projects that totaled over \$12 million dollars, including the UMES ADVANCE Program, which focused on issues related to African American women faculty in the STEM disciplines and led to the initiation of several institution-wide practices to promote the professional development of faculty. Dr. Mack received her Bachelor of Science degree from the UMES in biology and her Ph.D. in physiology from Howard University. She has extensive training and experience in the area of cancer research, with her research efforts focused on the use of novel antitumor agents in human estrogen receptor negative breast tumor cells.

**Shirley Malcom, Ph.D.**

*Head, Directorate for Education and Human Resources, American Association for the Advancement of Science*

Shirley Malcom is Head of the Directorate for Education and Human Resources Programs of the American Association for the Advancement of Science (AAAS). The directorate includes AAAS programs in education, activities for underrepresented groups, and public understanding of science and technology. Dr. Malcom serves on several boards—including the Heinz Endowments and the H. John Heinz III Center for Science, Economics, and the Environment—and is an honorary trustee of the American Museum of Natural History. In 2006 she was named co-chair

(with Leon Lederman) of the National Science Board Commission on 21st Century Education in STEM. She served on the National Science Board, the policymaking body of the National Science Foundation, from 1994 to 1998, and from 1994 to 2001 served on the President's Committee of Advisors on Science and Technology. Dr. Malcom received her doctorate in ecology from Pennsylvania State University; her master's degree in zoology from the University of California, Los Angeles; and her bachelor's degree with distinction in zoology from the University of Washington. She holds 15 honorary degrees. In 2003, Dr. Malcom received the Public Welfare Medal of the National Academy of Sciences, the highest award given by the Academy.

**Anny Morrobel-Sosa, Ph.D.**

*Provost and Senior Vice President for Academic Affairs, Lehman College*

Anny Morrobel-Sosa is Provost and Senior Vice President for Academic Affairs at Lehman College in New York City. Prior to her position at Lehman College, she was Dean of the College of Science at the University of Texas at El Paso (UTEP) and Dean (2003–2006) of the Allen E. Paulson College of Science and Technology at Georgia Southern University. From 2000 to 2003, Dr. Morrobel-Sosa held various high-level administrative positions, including Interim Associate Vice Provost for academic programs at California Polytechnic State University. During her career, she has published over 25 refereed papers and delivered more than 100 presentations in the United States and abroad, while continuing her research in physics, chemistry, and biomaterials. In addition to her senior administrative position at Lehman, Dr. Morrobel-Sosa holds a full professorship in the college's Chemistry Department. She received a B.Sc. in physics and chemistry from the University of Puerto Rico, an M.Sc. in chemistry from the State University of New York at Stony Brook, and a Ph.D. in chemistry from the University of Southern California.

**Maria (Mia) Ong, Ph.D.**

*Senior Researcher and Evaluator, Education Research Collaborative, TERC*

Maria (Mia) Ong serves as Senior Researcher and Evaluator at the Education Research Collaborative at Technical Education Research Centers (TERC) in Cambridge, Massachusetts. For 15 years, she has worked on qualitative research related to promoting diversity and gender equity in STEM education, with a focus on women of color in higher education and early careers. She served as the primary investigator of two NSF-sponsored studies on women of color in STEM: the "Inside the Double Bind" study with Gary Orfield, which has identified and synthesized 115 empirical studies on women of color in STEM; and a research study with Apriel Hodari, "Beyond the Double Bind," which analyzes life stories of women of color in STEM and the programs that support their success. Dr. Ong led the organization of the Mini-Symposium on Women of Color in STEM, which took place in Arlington, Virginia, in October 2009. Beyond her research, Dr. Ong is active in advising on national policy issues in STEM education and careers. She presently serves as a Member of the Social Science Advisory Board for the National Center for Women and Information Technology and as a member of the Committee on Equal Opportunities in Science and Engineering, the Advisory Committee of the GPRA Performance Assessment, and the Social, Behavioral, and Economic Sciences Advisory Committee at the National Science Foundation. At TERC, Dr. Ong is a Member of the Diversity Council and Evaluation Group.

**Steve Robinson, Ph.D.**

*Special Assistant, White House Domestic Policy Council*

Steve Robinson is on assignment to the White House Domestic Policy Council from the Office of Elementary and Secondary Education at the Department of Education. Dr. Robinson served as the Legislative Assistant for education in the office of Senator Barack Obama, advised on policy development during the 2008 presidential campaign, and worked on education issues with the Obama-Biden Presidential Transition Team. He joined the Department of Education in February 2009 and was assigned to the White House Domestic Policy Council in September of that year. Dr. Robinson first joined the office of Senator Obama in July 2005, supported as a fellow through the Albert Einstein Distinguished Educator Fellowship Program. Prior to joining Sen. Obama's office, Dr. Robinson was a high school science teacher in Eugene, Oregon. He grew up in the suburbs of Chicago and earned a biology degree at Princeton



University and a Ph.D. at the University of Michigan. On the biology faculty at the University of Massachusetts, he headed a laboratory and mentored Ph.D. students. His teaching experience includes more than 15 years in the classroom at middle school, high school, and postsecondary levels.

**Kecia Thomas, Ph.D.**

*Professor of Industrial-Organizational Psychology and Senior Advisor to the Dean for Inclusion and Diversity Leadership, University of Georgia*

Kecia Thomas is Professor of Industrial-Organizational Psychology and Senior Advisor to the Dean for Inclusion and Diversity Leadership at the University of Georgia (UGA). Her research and courses focus on the psychology of workplace diversity and organizational experiences of marginalized groups—especially people of color, women, and sexual minorities—and the impact of their work and professional experiences on their career mobility and overall well-being. She is the founding director of UGA's Center for Research and Engagement in Diversity and has served as the interim director of the university's Institute for African American Studies. Dr. Thomas is an elected fellow of both the Society of Industrial-Organizational Psychology and the American Psychological Association and editor of *Diversity Resistance in Organizations* (2008) and the forthcoming *Diversity Ideologies in Organizations*. She received her Ph.D. in psychology from Pennsylvania State University. In 2005, she published *Diversity Dynamics in the Workplace* (San Francisco: Wadsworth) and has authored and co-authored many other publications about diversity in management, the workplace, and human resources.

**Wanda Ward, Ph.D.**

*Office Head, Office of Integrative Activities, National Science Foundation*

Wanda Ward is Office Head, Office of Integrative Activities at the National Science Foundation (NSF). At NSF she has served in a number of science and engineering policy, planning, and program leadership capacities, including Senior Advisor to the NSF Director; Assistant to the NSF Deputy Director for Human Resource Development; Deputy Assistant Director for Social, Behavioral, and Economic Sciences; and Deputy Assistant Director, Education and Human Resources. Dr. Ward has provided critical leadership for the development of several NSF-wide activities, including the Human and Social Dynamics priority area, the Science of Learning Centers program, Cyberinfrastructure and the Social Sciences, the ADVANCE program, the Innovation through Institutional Integration (I-3) activity, and the Career-Life Balance initiative. She has also led or served on several NSF and interagency task forces, working groups, and committees, including the Committee on Equal Opportunities in Science and Engineering, NSF Career-Life Balance Working Group, and Subcommittee on Social, Behavioral, and Economic Sciences of the President's National Science and Technology Council Committee on Science. Dr. Ward received a B.A. in psychology and Afro-American Studies Certificate from Princeton University and a Ph.D. in psychology from Stanford University.





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