

THE TIME IS NOW

Systemic Changes to Increase African
Americans with Bachelor's Degrees in
Physics and Astronomy



TEAM+UP



FACTOR 1: BELONGING

Fostering a sense of belonging is essential for African American student persistence and success.

A sense of belonging is defined as an individual's feeling of being a welcomed and contributing member of a community. TEAM-UP's research on the student experience shows that fostering a sense of belonging is essential for African American student persistence and success. The recommendations emphasize the Faculty role in fostering a sense of belonging.

- With the encouragement and support of their chairs, faculty should learn, practice, and improve skills that foster student belonging in their interactions with African American undergraduates.
- In classrooms, student clubs, and common spaces, departments should establish clear rules of engagement that ensure that everyone is welcomed and valued and convey that inappropriate behavior will not be tolerated. Departments should also provide spaces and opportunities for education and ongoing discussion among faculty and students on ways to actively foster a sense of belonging and reduce barriers to inclusion.
- Faculty who teach or advise undergraduates should become aware that counterspaces are important for African American students and should assist students in finding the support they need inside and outside the department.
- Departments should establish and consistently communicate norms and values of respect and inclusion. They should periodically assess departmental climate with help from outside experts and should respond, as needed, with educational workshops led by experts from student affairs or other resources.
- Professional societies should lead a coalition, similar to the Societies Consortium on Sexual Harassment in STEMM, to address identity-based harassment beyond sexual harassment. Alternatively, members participating in the Societies Consortium should urge the existing body to broaden its efforts to include all forms of identity-based harassment including microaggressions and acts motivated by racism and bias.



FACTOR 2: PHYSICS IDENTITY

To persist, African American students must perceive themselves, and be perceived by others, as future physicists and astronomers.

Physics identity is defined as how one sees oneself with respect to physics as a profession, which evolves with one's perceptions and navigation of experiences with physics including recognition by others. African American students have to overcome stereotypes about who can become a physicist. How students perceive themselves with respect to physics is predictive of career intentions and achievement. As with belonging, the findings are a product of research by TEAM-UP and others. The recommendations provide departments with the means to create a strong sense of physics identity in all physics students.

- Departments should invite speakers with demonstrated research expertise on physics identity development and should work with faculty on evidence-based ways to strengthen students' sense of physics identity, including encouragement and recognition.
- Departments should examine whether their current activities foster physics identity, assess their efficacy across race/ethnicity/gender and other social identities, and modify such activities as necessary.
- Departments should diversify their faculty with respect to race/ethnicity/gender and other social identities in such a way that support of underrepresented students is provided by multiple faculty of varying identities.
- Departments should communicate the ways in which a physics degree empowers graduates to improve society and benefit their communities, for example by inviting alumni to speak to students about these issues.
- Faculty should feature and discuss a broad range of career options with undergraduates, utilizing resources such as the AIP/SPS Careers Toolbox and the advice of African American alumni.

**FACTOR 3:
ACADEMIC SUPPORT**

Effective teaching and a strengths-based approach to academic support are necessary for African American student retention and success.

Academic support is an obvious factor in student success. Too often, however, it is approached from the student deficit model—the idea that minoritized students have, as a consequence of their identity, learning challenges making them less capable than others. Combining deficit thinking with the problematic notion of meritocracy (McNamee 2018)—the idea that success is determined by ability, talent, and hard work—can lead to faulty judgment of students' potential. Site visits to the departments graduating the most African American students, as well as extensive research literature, show that the more effective approach recognizes student capabilities and builds on their strengths.

- Departments should encourage and support all new faculty to attend workshops on teaching and mentoring offered by their campus center for teaching and learning or other venues such as the New Faculty Workshop hosted by the American Association of Physics Teachers (AAPT) in conjunction with the American Astronomical Society (AAS) and APS.
- Departments should adopt policies and practices that encourage multiple faculty, including those who are not members of marginalized groups, to engage in formal and informal mentoring of students, and they should recognize and reward these efforts.
- Faculty and staff serving as undergraduate advisers should work closely with central advising offices to ensure that students facing academic, financial, and other difficulties can find the support they need.
- Departments should regularly and quantitatively assess their recruitment activities and curricular pathways, identify points at which students leave before graduation, and develop evidence-based, actionable plans to increase the persistence of all students to the degree.
- Departments should provide information about support services written in a manner accessible to and understandable by all students.

**FACTOR 4:
PERSONAL SUPPORT**

Many African American students need support to offset financial burdens and stress.

Colleges and universities provide students with many kinds of support in addition to academic support. African American students often face challenges that require assistance from non-faculty experts, and awareness and referral by faculty can improve the students' utilization of resources. TEAM-UP research identified financial challenges as the greatest difficulty facing African American students compared with students of other racial and ethnic groups.

- Departments should identify campus resources for emergency financial aid, conference travel, and other unmet needs and help students take advantage of them.
- Faculty should seek funding for undergraduate students to work in research groups or as Learning Assistants and find other ways to help students advance academically while earning money.
- Faculty and staff should normalize seeking help by discussing stress and self-care with students and referring them to campus resources.
- Faculty should strive to understand that students do not leave behind their identity and experiences when entering the classroom and should recognize the unique promise of each student from a perspective of strengths rather than weaknesses.
- A consortium of physical sciences societies should be formed to raise a \$50M endowment from foundations and individuals to support minoritized students with unmet financial need in physics and astronomy and to support the implementation of this report's recommendations by departments. As an interim step, physics and astronomy societies should raise \$1.2M per year to relieve the debt burden of African American bachelor's degree students.



FACTOR 5: LEADERSHIP AND STRUCTURES

For sustainability, academic and disciplinary leaders must prioritize creating environments, policies, and structures that maximize African American student success.

Effective departments create and sustain a supportive environment for all students. Department chairs play a key role in setting and acting on departmental priorities. Whether a department adopts the goal of increasing bachelor's degrees awarded to African American students, and what steps it takes to support that goal, are functions of the leadership. Effective academic leadership utilizes committees, existing decision-making bodies, internal funding and other resources, and coalition building to effect change. Sometimes a singularly dedicated faculty member, or a lone champion, creates a supportive environment for African American students. Evidence shows that such efforts are unsustainable.

- Department chairs and officers should set norms and values of inclusion and belonging; recruit, develop, and support a diverse faculty; and oversee structures, policies, and practices that enhance the success of African American students.
- Departments should identify, partner with, financially support, and advocate for campus programs like McNair Scholars that may already provide a scaffolding for student belonging, STEM identity development, and academic support of African American students.
- Departmental administrators should become familiar with and encourage students to utilize campus resources including student affairs offices, dual-degree programs, research funding programs, multicultural centers, tutoring centers, etc.
- Department chairs should provide incentives and rewards to multiple faculty members, including those who are not members of marginalized groups, who actively support underrepresented students.
- Professional societies should encourage existing and new groups within their organizations, such as the new APS Forum on Diversity and Inclusion, to examine ways to advance the recommendations of this and similar reports.

CHANGE
MANAGEMENT**A new level of thinking is required to solve a persistent problem.**

The underrepresentation of African Americans in physics is a systemic problem that cannot be solved through the work of individual faculty, departments, or professional societies. It requires coordinated efforts acting at all of these levels. In addition, standard approaches of strategic planning are unlikely to succeed because the underlying norms, values, and culture of the profession need to be addressed before lasting changes can occur. Fortunately, there is a growing body of literature on successful culture change in higher education to inform this work.

Professional societies have a leading role to play in this effort, as they did in the early 2000s with the SPIN-UP project to increase overall physics bachelor's degree production.

- Professional societies and individual departments should each develop a theory of change utilizing sensemaking and shared leadership. The societies should hold discussion forums on this topic. Additionally, representatives from all groups should jointly produce a unified change management model highlighting the interactions among the societies, universities, departments, and individual physicists and astronomers needed to support their efforts.
- Departments should review and learn from related reports and programs of other science and scholarly organizations including the AAS (Nashville Recommendations, Diversity and Inclusion in Astronomy Graduate Education), APS (LGBT Climate in Physics, Effective Practices for Recruiting and Retaining Women in Physics, Effective Practices for Physics Programs, and the APS Inclusion, Diversity, and Equity Alliance), AAPT (New Faculty Programs), AAAS (SEA Change institutional awards and a parallel Physics and Astronomy SEA Change departmental award planned by disciplinary societies in the physical sciences), AAC&U (Project Kaleidoscope), and the National Academies of Science, Engineering, and Medicine (Sexual Harassment of Women, The Science of Effective Mentorship in STEMM).
- The professional societies should empower and prepare change agents by establishing and participating in faculty networks, learning communities, and skill-building workshops, including organizing sessions at their annual meetings to discuss this and related reports.
- The professional societies should establish or increase rewards and incentives for efforts by faculty members to improve the success of African American students (and other marginalized group members, who are not the focus of this report) in physics and astronomy.
- The professional societies and individual departments should gather relevant quantitative, qualitative, and descriptive data about their organizations, disaggregated by race/ethnicity/ gender, as appropriate. Some organizational body, to be determined, should assess and publicly communicate progress toward the recommendations of this report every two to four years with both quantitative and qualitative data similar to those used in this report.