

Steps Toward Diversity and Inclusion

The Physics department has put in tangible work towards creating a welcoming and inclusive environment, and has set precedents for what that looks like at MIT. That said, there is a lot of work left to do. These are some thoughts and suggestions from the Society of Physics Students.

Main issues

The discussion during the June 4th department-wide meeting centered largely on faculty and graduate students. We'd like to focus on the problems that we see for undergraduates. In our view, there are broadly two major issues in the department.

- First, the specific actions of advisors, professors, and TAs can discourage URM students from staying in the department. Changing the way these individuals interact with students can lead to more positive experiences, and fewer people feeling that physics is not for them.
- Second, there is a widespread sentiment that certain identities are not as welcome as others. To address this, the department must become a more visibly open and welcoming space, provide meaningful support to URM students currently in the program, and actively welcome more URM students to join.

As a note, all of this applies to women students, LGBTQ+ students, first-generation and low-income (FGLI) students, and students of other under-represented and underserved backgrounds as well.

Individual interactions

Faculty and TAs can improve their handling of diversity and inclusion issues, particularly in how they advise and support URM students. This will help ensure that students have positive experiences with faculty and instructors, and will create support structures for the students who need them most.

Improving advising

A good advisor plays a critical role in the undergraduate experience: recommending classes, helping students plan for their career goals, and even providing emotional support. The academic advisor is one of the first physics faculty members an undergraduate interacts with, and is thus crucial for helping students (particularly URM students) feel welcomed and supported within the physics department.

Unfortunately, many advisors aren't currently fulfilling their roles as mentors, and this is an easy way to turn people away from the physics department by making them feel unwelcome. Many advisors, in trying to provide mentorship, end up warning students away and making them feel as though they are not up to the task of doing physics. Some of this is well-intentioned caution; some of it is probably the result of actual bias. The fact remains that for many students, the mentorship that is critical to success in academia (and at MIT more broadly) is totally lacking from their experiences in the department.

A solution to this is to **create more meaningful guidelines on how to engage effectively with students and provide useful mentorship**. However, assembling a list of guidelines is insufficient, because there are undoubtedly faculty who aren't invested in these issues and are thus unlikely to pay attention to or internalize any suggestions. **Written guidelines must be paired with clear policy to ensure that undergraduate advising is seen as a priority.** For example, diversity, cultural sensitivity, and mentorship training could be made available for all faculty. This has been a key part of the Graduate Students for a Healthy MIT platform as well¹. Additionally, a semesterly evaluation system for academic advisors, similar to that currently in place for classes, could be extremely useful here. Asking advisors to fulfill their duties is insufficient; we must also find a way to hold them accountable. An evaluation system could also help new students select their advisors in a more informed way — knowing a faculty member's advising style and level of involvement can help undergraduates pick who will work best for them.

We acknowledge that different students have vastly different needs when it comes to mentorship from an advisor. **In order to understand where the general opinion of the undergraduate student body lies, it would be instructive to hold a town hall and distribute a survey² to gauge opinions.** What do students value in an advisor? Where is the advising process currently lacking? Of course, there are considerations from the other side as well. What is it reasonable to ask of advisors? Do we need a different form of mentorship altogether in order to meet the needs of students? Regardless, such a survey or discussion would help the department understand what kind of guidance can be given to advisors so that they can effectively mentor students according to their priorities. (Of course, in order to ensure all undergraduates can respond without fear of retaliation, both the survey and evaluations should be anonymous.)

There are already some people in the department who do a phenomenal job of advising, far beyond what is required of them. In many cases, these people are URM faculty or TAs who take on the task of providing mentorship to URM students who cannot find it elsewhere. This is an incredible amount of extra work that these individuals are taking on. **The labor involved in making sure that URM students get the help they need should be recognized and compensated.** While there is a departmental award for recognizing outstanding academic advisors, there appears to be no way for undergraduates to recognize other faculty for their mentorship work. There is no equivalent for non-faculty mentors (postdocs, graduate students, or TAs), or for people specifically mentoring URM students. Departmental awards also do not come with tangible compensation that eases the responsibilities of those doing extra mentorship work. Faculty, postdocs, graduate students and TAs who are filling in the gaps and shouldering the burden of extra mentorship (which should be far more evenly distributed) ought to be rewarded with concrete benefits.

There are also many other avenues through which undergraduates receive mentorship beyond faculty. Many find mentors through their UROPs in the graduate students and postdocs they work with. However, having access to these mentors often requires finding a UROP early to build those relationships or having a pre-existing network of support. This is more likely to be true for non-URM students who feel more

¹ <https://actionnetwork.org/petitions/graduate-students-for-a-healthy-mit>

² We have started developing one: <https://bit.ly/mentors-survey>

welcome or at ease in the department. Finding a way to encourage and expand these avenues of support for undergraduates could help fill the gaps in advising. For example, research faculty could make it clear that they support graduate participation in mentoring programs, and there could be department-level investment into a more structured initiative.

Improving classroom interactions

Providing similar guidelines for mentorship expectations to professors and TAs of core undergraduate courses could also be extremely effective. The responsibility of being a professor or TA does not end with lectures or recitations. Being an instructor requires providing support and mentorship beyond the classroom. From this perspective, **office hours are a highly underutilized resource, and much of that is because professors are rarely seen as approachable mentors**. While some students certainly have a stigma against attending office hours, there isn't much being done by most faculty and instructors to counter this mindset.

There should be some guidance for faculty and TAs to help students outside the classroom, beyond questions about problem sets. **Ideally we ought to have a culture where instructors reach out to students who are struggling without waiting for the student to initiate**. Women are more likely to leave STEM majors in response to poor performance³, but reassurance from instructors might be able to help turn the tide around. Faculty have to be proactive about making sure that the students who need the help most are also receiving it. Part of this is making sure that office hours are a welcoming environment and that real emphasis is placed on encouraging students to attend. It also requires faculty to work to be more approachable. **Many professors are not seen as understanding of students' problems, or willing to support struggling students**. Inflexibility on deadlines, associating poor performance with laziness, and dismissal of questions perceived as simplistic all lead to this perception.

It's important to note that the type of networking with faculty that occurs during office hours often ends up being critical for undergraduates, in the form of letters of recommendation and general mentorship. **Unfortunately, many undergraduates underutilize office hours, due to the fear that their questions will be perceived as simplistic, or that they themselves will be deemed unprepared and unintelligent**. This fear is disproportionately prevalent among URM students, due to increased rates of imposter syndrome⁴ and stereotype threat⁵. Given these barriers to attending office hours, the people who attend office hours and start forming these networks quickly are those who come from strong backgrounds — they know that office hours are important and that letters of recommendation are essential, or simply have the confidence to be undaunted by intimidating professors. This leaves underprivileged and underrepresented students behind when it comes to application time. Faculty ought to be aware of this and be proactive about addressing it.

³ <https://www.nber.org/papers/w23735>

⁴ <https://psycnet.apa.org/record/2017-09930-002>

⁵ <https://www.sciencedirect.com/science/article/pii/S0065260102800090>

A good first step here might be to hold informal teaching workshops for faculty, perhaps during the faculty lunches. Many of these issues probably stem from just a lack of awareness, and helping faculty understand how to better approach teaching interactions could lead to real changes in the classroom.

Some guiding material on this certainly already exists. Ed Bertschinger put together a training for 8.02 TAs this past semester that by many accounts provided new and valuable insight into what mentorship should look like. **Expanding the 8.02 training and offering it regularly for all TAs (graduate and undergraduate) could have a tangible impact** on the way students in the physics department move through classes. This is a quickly implementable short-term solution for some of the inequities we observe in classrooms. Developing similar training for faculty might help in the longer term as well.

Another consideration is to take diversity into consideration when hiring GIR TAs (who are undergraduates). A physics GIR is the first interaction most freshmen have with physics at MIT, and it would likely help to make them feel welcome in the physics community if they felt they had a friendly face and someone they could talk to in the class. The importance of role models cannot be understated here — students will relate better to mentors who share their lived experiences as URM students at MIT.

A welcoming and supportive atmosphere

Improving faculty interactions with students is just part of moving towards a better physics community. We should also work towards increasing the number of URM students in our department and making sure that the broader culture in physics at MIT is one that welcomes and supports them. The current competitive sink-or-swim mentality doesn't work and actively harms URM students in our community; we need to focus instead on how we can encourage and uplift them.

Retention rate data

A good first step might be to collect data on the retention rates of URM students. This is an idea initially proposed by the BSU in 2015⁶. **If we collect anonymized data on how many URM students declare physics at the end of their freshman year, how many of those students leave, and after what classes, we can begin to get a better sense of where the problems lie within the undergraduate program.**

We can pair this data collection with broader surveys to better understand the climate in the department. Do students feel welcome? Do they feel as though they have a home in the department? Do they have mentors they can reach out to? Do they feel supported and welcomed by their peers? These are all questions that the department should be regularly asking its students.

Embracing diversity

There is a widely held feeling that the only thing that is valued about a person at MIT is the work they do, and that everything else is irrelevant. This is an incredibly harmful attitude. The work that we all do is influenced by our personal experiences and informed by the identities we hold, so **nobody should feel**

⁶ <https://web.archive.org/web/20160920095348/http://recommendations.mit.edu/>

that they have to change their personality, appearance, or behavior in order to be taken seriously. And yet this is the case for many, many people in the department: women and nonbinary students, URM students, LGBTQ+ students, and more.

Solving this problem requires not just an acknowledgment from the department that these identities exist in our community, but also visible and concrete support for individuals of these backgrounds. Only by confronting a culture of exclusion head-on can we shift to one of inclusion, equity, and support. This means that tangible efforts must be made to support and welcome students on the basis of identity. **The department must take steps to ensure that URM students are visibly and genuinely welcomed into the physics community, to show that there is a place for them in the field and that they aren't alone.**

It seems as though the effort to start a Diverse Physics Society stemmed from these intentions, but the challenge ultimately became finding leadership for the group. This isn't surprising; it's hard enough to find leadership when everyone's as overworked as they are at MIT, let alone to source leadership from a pool of students who are underrepresented and often isolated in the department. However, many of the tasks that the hypothetical Diverse Physics Society might have taken on should still be done by the department, perhaps even more effectively.

The department can **work with the OME to reach out to URM students as they enter MIT**, and to reach out to students who might have a stronger link with OME programs than the physics department. The OME also has a lot of expertise on uplifting URM students, and in connecting with them we might be able to get some insight into how the physics department can improve its outreach by better recognizing the needs of URM students.

The department could also **work with the physics department liaison at the GECD office to set up career-oriented events**. Many URM and FGCI students do not enter physics, math, or other abstract sciences because there's a perception that the only career pathway in these fields involves graduate school. Whether it be due to financial concerns, wanting to make a societal impact, or other personal reasons⁷, many students do not pursue graduate studies because they see academia as the only career available. It's understandable that this perception exists; by and large the only physics degree-holders most students know are their professors. But by working with the GECD office to set up career events, students can be made aware of the value that a physics degree has in diverse fields like finance, software engineering, law, national lab research, science policy, and more. These career events should preferably occur while freshmen are beginning to select their majors in the spring, in order to reach students who may initially not be considering physics. If we can make it clear that physics graduate school is not the only way forwards, that might go a long way to bringing in more URM and FGCI students from the start.

There's one more thing that the Diverse Physics Society might have done that could be a tangible step towards embracing the diversity of identities in our department. The department could **organize lunches or coffee breaks for URM members of the department**, which can be as simple as placing an

⁷ <http://www.ut-ie.com/articles/DMN-052118.pdf>

order for food and reserving a room. There appears to be funding available from the School of Science for initiatives such as this⁸. This gives URM students a way to find community in the department and to feel less isolated as physicists. Assuming individuals at all levels in the department attend — undergraduates, graduate students, postdocs, and faculty — students are less likely to feel alone and discouraged if they can see that there is a path forward in physics for people like them. This could also be the first step towards establishing a group for Black physicists, or reviving the Diverse Physics Society. A similar initiative would also be valuable for LGBTQ+ and FGJI individuals in our department. Specifically for LGBTQ+ individuals, the department could encourage faculty to put up the “You Are Welcome Here” stickers issued by the lgbt@MIT office. Small indications of support can help students be much more at ease. And when so many people feel as though they have to omit or hide parts of themselves in order to be accepted as physicists, an official recognition of diversity and encouragement of community from the department can mean a lot.

Support for research

For students with no prior exposure to academia, navigating the world of research is a monumental challenge. Many students don’t know how to go about finding a UROP; physics research at MIT looks nothing like most people’s experience of physics in high school, and making the leap is extremely hard. Many students don’t know whether the research they’re doing is valuable: is their project going to translate to something promising or meaningful, or is it a fun side project for their PI? Many students don’t know how to tell if the skills they’re gaining are useful for what they actually want to pursue post-graduation, or how to go about locating projects that will position them well for their futures.

One step to address this is building on the experience of this past semester to **maintain a centralized database of physics UROPs**. The current policy of “knocking on doors” doesn’t really work for students who don’t have a clear idea of what their research options are and who don’t yet have a foothold in the department. Many of these students also come from somewhat weaker backgrounds, with no prior exposure to academia or physics research in particular. An accessible UROP database will open up research opportunities for many more students much earlier on in their undergraduate careers, and diversify the pool of students who are able to do good research during their time at MIT. (As a logistical note, this database should be editable by graduate students and postdocs as they are often the ones making the actual requests for student researchers.)

The math department currently runs the SPUR+ program, which provides an organized and well-structured summer research program to minority undergraduates at MIT. Implementing something similar in our department can help students (who might not have otherwise) explore physics research and find community, by offsetting the need for prior exposure or a strong pre-MIT physics background.

These efforts must be coupled with some way of communicating to students what good undergraduate research looks like. Too many people spend too much time dithering in pointless projects or working in groups where they get no mentorship or support. There needs to be some way for students to learn what the ideal research experience looks like without relying on trial and error. One

⁸ <https://science.mit.edu/resource/quality-of-life-grant-program/>

option is to have students write up final reports on their UROPs (at least during the summer) which must be read and approved by their faculty advisors. In many cases the actual supervisors of undergraduates are graduate students or postdocs, many of whom don't have much experience in directing undergraduates. By requiring faculty to read a final report, the UROP process can be endowed with some meaningful oversight. For example, the summer SURF program at Caltech operates along these lines; it requires two interim reports and one final report and presentation over the course of the summer.⁹

As part of this, **the department could also hold some events to help students navigate the graduate school application process** and understand what the tenure-track process looks like. Ideally this would already be a non-negotiable part of advising, but a centrally organized event series would be helpful regardless. It's hard for students to plan well for their futures if they don't know what to expect.

Support for incoming graduate students

Along with encouraging URM underclassmen to join the department and creating a more supportive atmosphere, we could also do a better job of recruiting and supporting URM graduate students. The University of California system seems to have had some success with its UC-HBCU Initiative, whereby collaboration and cooperation with students and faculty at historically black colleges and universities (HBCUs) was encouraged and promoted. This directly led to an increase in URM graduate students in the UC system. Our department should **start engaging in similar outreach to HBCUs** to encourage students to apply to MIT. The effects seem to be tangible, and would contribute to increasing the diversity of perspectives in our department. If this works, it should be expanded to Predominantly Black Institutions (PBIs) and Hispanic-Serving Institutions (HSIs).

Once students are accepted, it's also important to encourage them to come to MIT. Stanford invests an entire day (GRAD Diversity Day) towards special events for URM graduate students after their graduate school visiting weekend.¹⁰ MIT could do something like this for URM students. Currently, GWIP holds a breakfast for admitted women during our open house, but URM students should get similar recruitment.

Some larger suggestions

The cultural issues in the department and the lack of support for students are pervasive issues and not easily solvable. We've proposed some steps that the department can take in the short term, but really solving these problems will require a visible commitment from the department to turn things around. This will undoubtedly not be easy, and will require a lot of work. That said, there are some commitments that the department can make over a longer time period that can have a meaningful impact.

We should **invite more URM physicists to present at colloquia and seminars**. Many Black physicists are currently bearing the burden of explaining how the environment in physics has often been hostile or unwelcoming to them. This is certainly a time for non-Black individuals in our community to listen and learn and educate ourselves, but this should not be the only time we look to Black physicists for

⁹ http://www.sfp.caltech.edu/students/summer_requirements/progress_reports

¹⁰ <https://graddiversity.stanford.edu/grad-diversity-day>

understanding. We should not just want to hear from them when there is a national crisis about being Black in America; we should be as willing to hear about the excellent work they're doing in physics as their personal experiences in the field. In order to achieve this goal, the math department at MIT covers all travel expenses for URM speakers who are brought to speak at math seminars or to math students¹¹. **Committing to inviting more speakers is a good first step, and hiring commitments would be a good second step.** An MIT-wide resolution was passed in 2004 to double the percentage of URM faculty and triple the percentage of URM graduate students within ten years¹². One of the BSU recommendations was to create an action plan to achieve this goal, which has been virtually ignored by MIT¹³. These hiring commitments are not about meeting arbitrary quotas: not having role models has an outsized negative impact on URM students, and similarly, representation can have hugely positive effects.

While it's certainly a huge challenge for our department to have an impact on the inequities in physics education globally or even nationally, we can start locally. The math department currently runs MathROOTS, a program for Boston-area URM high schoolers over the summer. The physics department could organize something similar, and pull volunteers from faculty, postdocs, graduate students, and undergraduates in the department — many of whom would certainly be more than willing to help. An exposure to fascinating physics beyond the high school curriculum and contact with people doing “real” physics can help high schoolers realize that physics is an option for them. Through this program, we can encourage brilliant but underserved students to come to MIT and nurture an interest in physics.

Finally, closer to home, the department should find a way to communicate what physics at MIT looks like to underclassmen. Currently the only real introduction students get to our department is through the GIRs, 8.01 and 8.02, neither of which really resembles higher-level physics. **Creating a seminar series or exploratory class for freshmen or sophomores** would help on this front. Students could meet professors, find community among their peers, and discover interesting physics. This would provide a useful counter to the image of physics that students receive from 8.01 and 8.02. This would also inculcate a baseline level of comfort with faculty, thus creating a foothold in the department for students and helping them feel more comfortable approaching faculty in the future.

Summary of recommendations

This document has covered a lot of ground and discussed many different issues in the department. We have made a number of suggestions and explained our reasoning for them. Below we summarize our recommendations, organized in the short- and long-term and sorted by the problems they address.

Shorter term actions

Advising and mentorship

- Survey and town hall to understand current undergraduate perspectives on advising
- Development of written advising guidelines and clear, enforceable policies

¹¹ <https://math.mit.edu/community/diversity.php>

¹² <http://web.mit.edu/provost/raceinitiative/>

¹³ https://diversity.mit.edu/sites/default/files/images/BSU_Scorecard_v1.1.pdf

- Faculty advising training with a focus on helping students from URM and diverse backgrounds
- Compensation for outstanding mentors of URM students (faculty and TAs)

Teaching and the classroom

- Trainings for all TAs (graduate and undergraduate) based on Spring 2020 8.02 mentorship training
- Faculty training to improve classroom interactions with students (especially URM students)
- Proactive check-ins by faculty or advisors for struggling students

Recruiting URM students

- Regular surveys to gather data on URM student retention rate
- Partnership with the OME to reach URM students (particularly underclassmen) at MIT
- Career events with the GECD office to emphasize physics careers beyond academia

Creating a diverse and welcoming community

- Department-organized meetups for URM, LGBTQ+, and FGMI students
- Event for URM students during the graduate open house

Supporting undergraduate research

- Centralized and regularly updated database of UROPs
- Event series to help students navigate grad school applications and academia

Long-term goals

Advising and mentorship

- Regular anonymized evaluations of academic advisors
- Expansion of mentorship structures outside academic advising

Teaching and mentorship

- Creating a more open and welcoming classroom environment
- Normalizing asking for help, academic and otherwise

Recruiting URM students

- Outreach efforts in the Boston area for high school students
- Exploratory seminar classes for underclassmen
- Increased diversity among 8.01 and 8.02 TAs

Creating a diverse and welcoming community

- Outreach initiative to HBCUs, PBIs, and HSIs
- More diverse speaker invitations for colloquia and seminars
- Accountable and transparent hiring commitments

Supporting undergraduate research

- Internal structure to ensure that UROPs are valuable experiences for students
- Structured summer programs to boost URM involvement in research

Committing to progress

Improving the diversity and equity of the physics department is not a goal that can be accomplished within a semester; it must be a constant priority for the department. We have laid out an ambitious agenda here, but it is far from unachievable. This document should be regularly revisited to ensure that not only is progress being made on the action items listed above, but that these suggestions are being implemented effectively and for the right reasons. **We support the BSU's recommendation that every department should have a hired staff member whose sole job is to work on improving diversity, equity, and inclusion.** We also recommend that the department regularly solicit feedback from the Society of Physics Students and the undergraduate body to ensure positive progress is being made at an adequate pace. It will take hard work and sincere efforts from the entire department to create real progress, and maintaining accountability will help accomplish this.

Stanford Physics has a page on their website with a detailed strategic plan to improve equity and inclusion¹⁴. Many of their suggestions mirror ours. Harvard has an equity and inclusion department committee, focusing on recruitment and retention¹⁵. This level of department-led investment in these issues is essential for progress to be made. The Society of Physics Students will be happy to participate and assist in these efforts in any way we can — we are beginning some efforts to survey students ourselves and to compile suggestions and advice on how to navigate the physics undergraduate experience — but the leadership on this issue ultimately should not rest on students' shoulders.

In conclusion

The physics department has demonstrated a commitment to diversity, equity, and inclusion. The establishment of the Physics Values Committee and the creation of the Values Statement were critical first steps. To progress from here, we need to work to change the current sink-or-swim culture in the department. This might be a crucible that pushes some students to excel, but it crushes many, many others — disproportionately URM, women, and other underserved students. The suggestions we have made are just a starting point, but we hope they have clarified the challenges that face students. MIT students are smart, hard-working, and curious people, and the department owes it to them to give them the support, encouragement, and mentorship they need to excel.

¹⁴ <https://physics.stanford.edu/about/equity-and-inclusion/strategic-plan>

¹⁵ <https://www.physics.harvard.edu/equity>