Inclusive Physics Culture

Helpful suggestions from the Harvard Physics Department, with thanks to the many members of the Physics community who have contributed their input

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The Physics Department is a community in which students, faculty, and researchers from across the globe, working with staff and administrators, can come together to study, learn, and expand the frontiers of knowledge. This document discusses ways in which we can all do our part in fostering a welcoming and inclusive environment in which everyone can thrive.

We've written this primarily for undergraduates, so most of the issues discussed are undergrad-specific. However, a number of the topics are also relevant to other groups – grad students, faculty, staff, postdocs, administrators, etc. So there is something here for everyone. And even for the topics that pertain only to undergraduates, it is helpful for other groups to be aware of the challenges that undergraduates may encounter.

The pages below contain many suggestions, words of caution, and things to keep in mind concerning the department's culture and environment. As you will notice in the discussion, some key traits in being a valuable member of our physics community are humility, self-awareness, and respect for others. We are sure that the set of suggestions contained here is incomplete, but it isn't feasible to capture everything in a single document. We welcome any comments you may have. In the meantime, we do hope you will find the suggestions here useful.

The many faces of physics

There is no blueprint for building a good physicist, just as there is no one kind of good physics. The puzzles we encounter in exploring the physical world are much too interesting and too varied to yield to any one approach or any one person. Today's physicists are exploring the world in many different ways, and each of these requires many researchers with different skills. Fortunately, the human brain is amazingly flexible. There are many different axes of abilities and strengths. The "space" of ability is multidimensional, and physics talent is impossible to describe in terms of any small set of numbers, certainly not a single dimension like GPA or IQ. No two good physicists have exactly the same set of strengths, and there are almost certainly many ways of being a good physicist that have yet to be realized.

There are amazing physicists of all identities, genders, ethnicities, nationalities, religions, and backgrounds who have made major contributions to the field and who have had exciting intellectual adventures along the way. This diversity is crucial to the multiplicity of skills and

approaches that we need to keep our science healthy. So please dispose of any stereotypical assumptions you may have inadvertently acquired about what a physicist looks or acts like.

Likewise, there are many different types of learners. Some are visual, others aural. Some are theoretical, others hands on. Some prefer working in groups, others alone. Some are bottom up, others top down. Some like planning ahead, others like the thrill of cutting things close. And each of these categories can be further subdivided, and so on. You are unique and each of your fellow students is unique, and each of you has the capability of learning and contributing to physics in your own unique way.

Different backgrounds and goals

College is very different from high school, and it takes some getting used to. It can be a bit overwhelming at times. In general, college is more difficult, the courses move faster, and overall things are more stressful. You might feel like you've gone from the proverbial big fish in a little pond to a little fish in a big pond. Harvard certainly *is* a big pond. Your fellow students have the most diverse set of intellectual skills you are likely to encounter anywhere. Some are so far out in some very particular direction in the multidimensional space of intellectual skills that they can seem quite scary to the rest of us. But this doesn't mean you're not still a big fish! You are at Harvard because your personal set of skills shows the promise of a meaningful contribution. If the big Harvard pond seems daunting at times, just remember that *you're all in it together.* After a little while, most of the shock will wear off and things will settle down, and at that point all you need to do is work together and enjoy the intellectual diversity.

Be careful not to make assumptions about backgrounds. Students come to Harvard with a tremendous variety of experiences, challenges, resources, and perspectives. So don't view them through the specific lens of your own background. Different backgrounds can be a source of strength and can develop into new and different ways of contributing.

As varied as students' histories are, so too are their futures. Some students choose to head to grad school. (About 50% of our concentrators go to grad school, with a nontrivial fraction of these pursuing a field other than physics.) Others pursue law school, med school, software, consulting, finance, teaching, and all sorts of other interesting endeavors. If you want to continue on with physics, go for it. If you instead want to do something else, then more power to you. The quantitative and logical skills you learn by studying physics are universally applicable, and the Physics Department's view is that the more people there are in the world who can think quantitatively, doing whatever they wish to be doing, the better.

Actions and types of behavior

The above considerations imply that there are many actions and types of behavior that are helpful in creating a positive environment. Likewise there are other actions that have a negative effect, which you should be careful to avoid. The bullet points below include both of these

categories. Some are specific to undergraduates, while others are more widely applicable and relevant to many other types of interactions (student-faculty, staff-faculty, and so on).

- When working in groups, be welcoming to anyone who might want to join. Keep an eye out for students who are working alone. Of course, it might simply be the case that a given student wants to work alone on a particular problem. But still keep an eye out. In any case, don't be cliquey. Put yourself in other students' shoes.
- In study groups, remember to be courteous to the other members. It's great if you get excited about things and shout "Eureka!" every now and then (we encourage this!), but be careful to make room for other approaches. Remember to regularly take a step back and make sure that everyone else has the opportunity to give their input and bring up any questions. This holds for lectures and sections too. It's great to ask questions (even a lot of them!), but just be sure that other students also have a chance to speak.
- Be careful not to interrupt people. We are all guilty of this now and then. We often notice when other people interrupt, but not when we ourselves do. So please do your best to monitor yourself. You may also find it helpful to team up with a friend and monitor each other – as long as you trust them to tell the truth, and not just what you might want to hear!
- Learning is not a competition. It is a team sport with only one team! So embrace the big Harvard pond as an opportunity for collaboration, not competition. Almost all science is done by teams of people, and part of your physics training is learning to work with others to solve problems. Don't be the one competitive person in a group where everyone else is working together and helping each other out. It's often the case that competitive people aren't so much concerned with *winning* as they are with *not losing* (see the discussion below on insecurity). And they think that the best defense is a good offense. The trouble is, no one else is playing their game.
- Unfortunately, grades often play into the false narrative of competition. It is fine to be proud of your A grade. But you need to be aware that other students may have good reasons to be proud of their B- grades. Grades, like any other small set of indicators, do not tell you much about what is really going on. Concentrate on your own progress instead of comparing it with anyone else's. Learning is the objective.
- Take the courses that are right for you when they are right for you. Successful Harvard physics concentrators have started their journey as first-years with AP50, PS10, PS12a, Phys 15a, 16, 19, or no physics at all. The physics concentration is flexible because we want to make it work for the diverse group of students we need in the field. Some students take graduate courses to get deeply into a subfield of physics, while other students focus on 100-level courses to get a broad view of physics. Talk to your advisors and figure out what works for you, and never let your peers pressure you into the wrong choices.
- Be open-minded and welcoming to other students, and don't judge them. Judging invariably involves picking an arbitrary set of axes along which you want to do the judging. And as mentioned above, there are countless axes and there is no "best"

direction. Instead of judging others, get to know them and how their minds work. You may see new approaches that will be useful for you as well.

- Be especially careful not to confuse preparation with ability. Students come to Harvard with myriad different backgrounds. Preparation is a transient effect that doesn't make a huge difference in the long-term.
- You never know what people around you are going through. And for that matter, you might not even know what you yourself are going through. Harvard can be a high-pressure environment, and feelings of stress, anxiety, and depression can creep up and affect you more than you realize. So please reach out and get help, both through your House or Yard Dean and through Counseling and Mental Health Services (CAMHS), which has counselors available 24/7. And be attentive to fellow students who might need a helping hand.
- Recognize how your words can affect others. This doesn't mean you need to overthink everything you say, but rather just keep in mind that the words that come out of your mouth will end up in someone else's ears. They don't just float off into the ether. So maintain a base level of common sense and awareness.
- If someone points out that you may have said or done something inappropriate, do your best to avoid the knee-jerk reaction of getting defensive. Be receptive to what they are saying, and look at the situation from their point of view. There will almost certainly be something that can be learned for the future.
- Be respectful and don't make fun of what you might think is a "dumb" question that a fellow student asks. Instead, listen carefully and see if you can identify what the confusion is. If so, you may be able to make a helpful comment rather than a hurtful one. This is very useful because many other students probably have the same "dumb" question. Furthermore, the question might actually have not been dumb at all, but instead a really good or deep one whose point you missed. The history of physics is littered with dumb questions that led to major discoveries! Everyone should feel comfortable about asking anything.
- Don't make disrespectful jokes. People often hide behind humor and think that just because something is funny, it can't be offensive. That is quite incorrect, and in addition to causing harm, it has gotten lots of people into lots of trouble quickly. You shouldn't make fun of people, because along with being cruel, all you're really doing is saying something about yourself (see the discussion below on insecurity).
- Many of the most successful physicists tell stories from their student days of hearing other students tell them that they weren't good enough to be there, or cast doubt on the legitimacy of their admission to whatever program they were in. So we want to be crystal clear – you're here because you deserve to be, and because you have a lot of potential to learn and grow and contribute in important ways. If another student ever tells you otherwise, they're again merely saying something about themselves.
- Integrity and honesty are critical components in any academic discipline, and it goes without saying that you should not cheat. But even leaving aside ethics, cheating isn't remotely close to being worth the risk. A permanent black mark from the Ad Board on your transcript is infinitely worse than a bad grade. If the stress of an exam or

assignment gives you a temporary fit of insanity, please just stay sane enough to recognize that many students get bad grades now and then. A permanent record of cheating, however, is a vastly different matter.

- Act in a professional manner, which is roughly equivalent to saying: be respectful to others, take your responsibilities seriously, and act with integrity. Of course, this doesn't mean that students can't act like goofballs together while working on homework late at night. That can be perfectly consistent with respect, responsibility, and integrity!
- Reputations matter. You don't want to be known as the most intimidating, perfect, and always-correct person in the room. Instead, be the person everyone wants to work with. The person they can count on. Someone who will listen, be a good teammate, and build other people up.

Ways to respond

What should you do if you witness demeaning and hurtful behavior? There is no one correct answer; it depends on the circumstances and on what you are comfortable saying or doing. You can certainly speak up in real time and let the person know that such behavior is not tolerated in our community. If you aren't comfortable doing so (and even if you are), you can give support to the affected person(s) afterward. Empathetic action on your part speaks volumes and lets the person know they're not alone and that yes, the other person was being inappropriate. Unless the incident is minor (the person apologizes and the affected person is fine with the outcome), you should let someone with authority know about the incident. For serious incidents, the "should" here becomes much more of an imperative.

If you yourself are the recipient of demeaning behavior or are made to feel unwelcome in any way, much of the above advice again holds. Don't hesitate to speak up, but in the end, you should take whatever action you are comfortable with. However, *please* take at least some action, even if it's just talking with a friend about it. Don't fight inappropriate behavior in isolation. And again, for serious incidents, be sure to contact someone in a position of authority.

There may be occasions where you witness negative behavior that isn't intentional, but is still harmful. If possible, say something politely to make the person aware of what the effect of their behavior was. There might just have been a misunderstanding. Or maybe the person is having difficulty adjusting (see the discussion below on insecurity). This is certainly not to say that such behavior is acceptable, but rather that good people can make mistakes, and sometimes we all need a reminder to act in a more thoughtful manner. In many cases a reminder gets the job done – someone learns something, and the culture takes a step in a positive direction.

In the other extreme, *repeated and deliberate* demeaning and hurtful behavior is an entirely different story. And likewise for one-time incidents of a serious nature. In these cases, independent of how you might be able to address the situation in real time, it is critical that you

contact someone with the authority to take corrective action, or who is not many steps removed from such authority. People in these categories include professors, concentration advisors, House and Yard deans, House tutors, staff coordinators, and others. In addition to being able to ensure that action is taken, these people also have a collective-knowledge bird's-eye view of other similar behavior that may have occurred.

Within the Physics Department, you are encouraged to reach out at any time, about any issue, to Prof. Georgi (Co-Head Tutor), Dr. Morin (Co-Head Tutor), Hannah Belcher (Student Coordinator), and Prof. Kaxiras (Chair). You can also submit anonymous concerns or suggestions through the Physics Department website under About > Physics Feedback Portal.

Additionally, in your house/dorm you are encouraged to contact your Resident/Yard Dean (a critically important person for essentially every issue) and Resident Tutor or Proctor, along with many other advisors.

Demeaning behavior, insecurity

There are many causes of detrimental behavior, ranging from implicit biases to simply being unaware of the consequences of our actions, even if we have the best intentions. However, there is one cause in particular that comes up often and is easy to identify – namely insecurity.

In any field, and physics is no exception, you will occasionally encounter people who act in an arrogant or demeaning manner. This can of course negatively affect the culture, even if it's only a few people. Most arrogant and demeaning behavior has its roots in insecurity, so it's worth discussing this. It's helpful to keep this root cause in mind if you are ever subject to such behavior, or if you ever find yourself slipping toward such behavior.

The range of backgrounds and skills on the Harvard campus is almost limitless, and it's hard to imagine anyone who has never felt at least a little insecure about something at one point or another. This holds for people of any age and at any point in their career, from students to faculty. Some level of insecurity is inevitable, and there's nothing wrong with that. What matters is how the person reacts. There are three basic possibilities:

1. An insecure person may feel a little uneasy, but they recognize that all they can do is forge ahead. The insecurity is relatively inconsequential in this case and may even motivate them.
2. An insecure person may get discouraged and give up. If you find yourself in this category, try your best to transform it into the first reaction. It always helps to talk with some friends and advisors to get some perspective. It's invariably the case that your view of yourself is lower than it should be. It's common for students to think that everyone else has better preparation, is smarter, and picks things up more quickly. Some do, some don't. And as emphasized above, it depends on what is being picked up. The point is that it doesn't matter. There are countless everyday runners who are overjoyed when they hit a new personal-best time, even though it might literally be half as fast as the world record pace.

It's clearly not productive to compare yourself to an Olympic gold medalist. And that is an example where "better" has some meaning. But because of the multidimensional nature of intellectual pursuits, it is just plain silly to compare students. Remember that there are lots of skills and that "better" doesn't mean much. Students should spend their precious time understanding and developing their own skills so that each has a personal intellectual base-camp from which to explore. They should not waste their time on meaningless comparisons.

3. Finally, an insecure person may overshoot in the other direction and act in an arrogant or demeaning way to hide the insecurity. There are two basic ways in which this can happen: They can build themselves up, or they can tear others down. The first of these responses is tiresome and embarrassing but relatively harmless. Other people can just roll their eyes and ignore the arrogance. The second possibility is what causes real damage. It is an active attack on another human being and there is no excuse for it. Unfortunately, there are people who react to insecurity this way, making others feel that they don't belong or that they aren't good enough. All of us have been the target of such behavior and it hurts, even if we correctly recognize that the behavior stems from insecurity and that it's just a coping mechanism. As a very self-aware quote from a particular sitcom goes, "I'm insecure, and I judge people to cover up for it."

So if you're ever feeling insecure (which is inevitable sooner or later), aim for the first of the above three reactions. Get back to your important job of understanding and developing your own skills and try to avoid the other two reactions at all costs. If you see someone in the clutches of the second one, lend them a helping hand. And if you see someone falling into the trap of the third reaction (especially demeaning actions), by all means say something if you are in a position to do so. There are many levels to how you can respond if you witness demeaning behavior (see the earlier discussion). But if nothing else, you can at least remind the recipient of the behavior that the root cause of it is the offender's insecurity. The behavior speaks volumes about the offender, and nothing about the recipient.