Abridged Chat (Q&A is given after Chat)

Moderator: Welcome to the Missing Physicists special colloquium, a panel discussion of the recent "Missing Physicists" article package in Science examining the barriers Black physicists face and potential models for change.

Moderator: The articles are summarized in the handout for those in person and online at https://physics.unc.edu/missing-physicists/ for those on Zoom. For those unfamiliar, please note three acronyms you may hear often today:
URM = underrepresented racial minority

HBCU = historically black college or university

PWI = primarily white institution

Moderator: The handout and webpage also list information about our panelists. Briefly, we welcome (from left to right):
Zack Hall, a graduate student here in the UNC-CH Physics & Astronomy Department and founder of the URM graduate-to-undergraduate mentoring program described in article #3.

Dr. Jennifer Weinberg-Wolf, Associate Director of Undergraduate Studies in our department and leader of undergraduate advising.

Dr. Sheila Kannappan, Associate Chair for Diversity and Mentoring in our department and founder of the computational boot camp described in article #3.

Dr. Kent Wallace, Dean of Graduate Studies and Discipline Coordinator of Physics at Fisk University and expert in educational and social science research, with roles in multiple HBCU-PWI partnerships

Dr. Roy Clarke, Professor at the University of Michigan, Ann Arbor and founder of the highly diverse Applied Physics graduate program described in article #5.

Dr. Mohammed Ahmed, interim Associate Dean of the College of Health & Sciences at NC Central University and founder of a new multi-way HBCU-PWI partnership to provide undergraduate traineeships at Triangle Universities Nuclear Laboratory, where he is Associate Director.

Moderator: Each of the panelists will now proceed with some prepared comments.

Bridgette James to Hosts and panelists: Exposure and access does play a significant role through outreach and engagement in the community.

Moderator: We will now begin the next part of the program. Each panelist will have up to 3 mins to respond to one of two questions about Energizing the Majority and Achieving Structural Change and Lasting Progress.

Moderator: 1. Energizing the Majority. In leading efforts to create opportunities and a welcoming environment for Black students, as opposed to just contributing an hour here or there, we see other marginalized groups stepping up, but almost never the straight white males that numerically dominate physics. What can make this group care about Black representation in physics and abandon the deficit model? What personal interactions, structural incentives, or other motivators have you seen, or could

you imagine, energizing those who have never experienced marginalization to make changing the culture of physics a daily work priority?

Dave Caudel to Hosts and panelists: Well said, Dr. Wallace!

Moderator: 2. What have you seen or would you wish to see in terms of structural changes – institutional, financial, partnerships – that can replace isolated, overburdened, transient champions for Black students with lasting incentives for progress and collaborative work on ongoing solutions between Black students, faculty, and allies & institutions? What differences have you seen between approaches that work and those that fail?

Moderator: We will now begin the Q&A session. Attendees on zoom can submit questions using the Q&A feature. Attendees can view all submitted questions and upvote questions important to them. We ask everyone to be respectful when submitting questions.

Moderator: Also, we recognize that some of our Zoom attendees are experts on inclusive education, and we invite them to submit their insights in the Zoom chat. While the chat will go only to the panelists right now, we will save it and share it with all registered attendees.

Casey Miller to Hosts and panelists: Thank you all for this event. The APS created the National Mentoring Community to facilitate and support mentoring relationships between Black/African, Latinx, and Indigenous undergraduate physics students and physics mentors. Does anyone know if it is having an impact? https://aps.org/programs/minorities/nmc/

Mitaire Ojaruega to Hosts and panelists: Yes indeed. I can testify to exactly what Roy is saying. The Applied Physics had a way of identifying areas that students may lack complete knowledge. Sometimes students came in with a Physics background but not necessarily having all the courses at times. So the program allowed students to cover those gaps while progressing through the program.

Anne Williams to Hosts and panelists: Yes! Completely agree.

Moderator: Thank you for attending the Missing Physicists special colloquium. We appreciate that you took the time to attend this event and hope you leave energized to work for progress.

Anne Williams to Hosts and panelists: 👏👏👏👏👏👏👏👏

Rache McClure to Hosts and panelists: 👏

Casey Miller to Hosts and panelists: thanks, all

<u>Q&A answered by panelists (mostly since the event)</u>

1. What are some of the ways your department/institution protects students from toxic gatekeeping?

   SK: As an advisor to UNC's Visibility in Physics undergraduate club (a club for all underrepresented groups and their allies), I tell them that if a faculty member ever tells them they can't do what they want to do, please come talk to me and get a better answer. There is always a way forward, albeit I won't hide the work they'll have to do to get there. I've also led discussions of impostor syndrome for both ViP and SPS in which we talk about how gatekeeping creates/intensifies impostor syndrome and how it's really not about the student but says more about the faculty member. But a student

who has experienced gatekeeping behavior needs to talk with an ally to be reminded that it's not about them, because gatekeeping cuts deep, and that hurt can last for years or decades.

JWW: As an undergrad advisor, I speak with at least a quarter of our undergrads every semester and ask specifically about individual classes and any specific problems. Word of mouth means that other students in the department know they can come talk to me. I can address specific issues with individual faculty or bring in the Director of Undergraduate Studies and/or the Department Chair when necessary.

Kent
It is very important for universities/departments to have a safe space where students can voice their concerns. I cannot emphasize enough how just having someone to talk to can sometimes ease the burden that many students experience. I can recall several instances where students simply needed to know that somebody acknowledged their experience as valid. I don't suggest that this is the only step, but I feel many take this safe space for granted.

Ideally the next thing should be a mechanism to take these voice concerns to administration in a way such that that student can feel safe that there will not be reprisals for expressing their views. I believe universities must take the stance that these concerns are not coming out of thin air. It may be the student's perception, but there needs to be time for reflection. After this reflection, policies and actionable steps should be taken to ensure that the University/department can grow in a positive way and adapt practices that are not only inclusive but help the institution evolved in an informed way.

2. What are some steps PWIs can take to emulate the nurturing environment of HBCUs?

   Answered live.

3. How can PWIs support HBCUs that have smaller research funds and higher teaching expectations?

RC: Research partnership (with the PI from the HBCU) where BOTH partners have commitment to success of the research. This means each partner accepts a level of flexibility that accommodates the needs and expectations of the other partner(s). Student involvement is paramount. An excellent way to form such a partnership is through one of the national labs where research facilities that are beneficial to the research project are often central to the research being performed. For example, the synchrotron facilities at Brookhaven or Argonne Labs, or the Rare Isotope Facility at MSU. Note that arrangements such as a PWI adding a token minority serving institution to their proposal, solely to increase a proposal's chances of being funded, have been common, but are not as meaningful as the kind of equitable partnership described above.

Kent
I believe PWI's and HBCUs should collaborate and proposal partnerships. However, these grants should be structured in a way such that the HBCUs are the lead institutions. These proposals should also have allocations for infrastructure building. PWI's can be very informative on what infrastructure should be implemented to help HBCUs build capacity. In time HBCUs would be able to conduct significant portions of research in collaboration with their PWI partners. These type of

partnership should not be looked at as competition. These are endeavors that allow both academies to conduct substantive portions of the overall research.

4. How do you build programs that last beyond their initial founder?

   Answered live.

5. It is sometimes said that the pace of change follows the comfort of the privileged. What should/can leaders do to counteract this tendency?

   RC: Bold, visionary leadership is called for and this often forces faculty and mid-level administrators to break out of their comfort zone. There is obviously a gradient working against this under the archaic structure of most universities. One example of a counter trend is for the administration to encourage hiring of underrepresented junior faculty by creating a "Presidential Fellows Program" funded by the university general fund, whereby outstanding URM postdocs can be prepared, proactively, for a faculty position within 2 -3 years (in some case receiving a guaranteed on-ramp to the tenure-track). This provides an incentive and a channel for hiring that is in addition to the traditional search committee process. Faculty search committees tend to favor research group preferences over considerations of increasing diversity. Such a fellows program is one way to counteract this tendency.

   SK: I'm not a gradualist. I like to get many people – students, faculty, and staff – involved as both leaders and participants, and to create obvious DEI machinery that would be hard to dismantle without public embarrassment when the pendulum swings against progress. For example, UNC originally requested that our department have a faculty "diversity liaison." As the first highly active person in that role, I became our first Associate Chair for Diversity, but I made sure another faculty member would assume the diversity liaison role (interfacing with university-level efforts) to enhance our DEI capacity. In subsequent years I added graduate student, undergraduate, and staff diversity liaison roles within a growing Diversity Committee. For a couple years with a change of leadership I no longer had direct influence on much of what I had worked on, but the machinery and the many people who believed in it remained. When I returned to the Associate Chair for Diversity role in 2020, it was just as COVID was arriving. Many people who don't usually think about social justice became energized that summer, so I started the PHYSAST-DIVERSITY Slack, which became a committee of the whole where everyone could contribute. Grassroots projects such as the G2U mentoring program sprang up, and I focused on connecting people and shepherding DEI efforts from all corners. Empowering young people puts change in high gear – they are not gradualists! For example, they asked that 100% of our physics & astronomy faculty do an *optional* allyship training to support sexual harassment survivors (on top of the University's required Title IX training). I helped them make the case, and within a year we got to 75%. Not perfect, but a sea change. I think real change can happen faster when students appeal to faculty hearts and minds than when administrators try to force change (especially if they themselves don't embody it).

6. Out of state students may have financial limitations to join PHD at UNC. Graduate financing should be looked at.

   SK: It is a common misconception among undergraduates that they will have to pay to go to graduate school in physics, but in fact students **get paid** to go to graduate school in physics (albeit

modestly) and their tuition is also fully covered. There is no difference between in-state and out-of-state students at UNC, and I don't know of any university that charges out-of-state students to do a PhD. To encourage URMs in physics (as well as first-gen students and others for whom the system is not transparent), it is VERY important that faculty and academic advisors repeat to students early and often (starting from intro classes!) that they can *get paid* to go to physics graduate school.

RC: A shout out here to the NSF's AGEP-GRS program, which provides 3 years of fellowship support for the PI of an existing NSF-funded research project to add a URM PhD student to their group. This support (for tuition and stipend) has been critical in enabling many Black PhD students to embark on, and successfully complete, their PhD dissertation projects.

7. What sort of training do grad students undergo to effectively mentor undergrad URM?

ZH: The graduate student mentors receive training sessions, using material aggregated and led by faculty members, over the summer before the year they receive mentees and as well as any on-going sessions that become available from the university (e.g. Mental Health First Aid Training).

SK: Part 1 involved reading a summary of the AIP TEAM-UP report and discussing it. Part 2 was a three-plus-hour faculty-led training (for which I am happy to share the slides) covering issues and discussing scenarios relating to many aspects of mentoring, for example, ground rules and confidentiality, alignment of expectations, resources and networks, empathetic mentoring and active listening, and group discussion leading (using impostor syndrome as an example discussion topic). A key point was to emphasize that just being a URM does not mean you understand the experience of another URM, especially having achieved the success of being a physics graduate student and taking into account intersectionality and individuality. This two-part training was never meant to be adequate – we planned to have regular meetings of grad mentors with each other and with the faculty advisors to address challenges and topics left out of the initial training – but the G2U grad organizers simply could not coordinate all the events they had planned, what with everything being new. The department chair is trying to arrange some staff support and the whole student+faculty planning team will be meeting this summer to analyze successes and failures and prepare for the second year of the program.

8. What is more of a focus? To have diversity that matches the diversity of a country's population (if 12% of Canada's population is Asian, we'd want 12% of physics grads in Canadian colleges to be Asian) or the diversity of the global population?

RC: science is a largely a collaborative activity and so equity and inclusion should be an important goal. A long-standing concern in the US physics community is that certain members of society (especially women and URMs) have been discouraged from equitable access to the field. This causes the potential of many young people to be underutilized and underappreciated, creating a downward spiral of discouragement at a time when we as a society are in significant need of such skills. Representation is not just a bean counting exercise, it's making the most of the human resources available; for the US, that includes a very diverse spread of communities, both domestic and immigrant.

9. The students from Fisk seem to be highly motivated towards getting a Medical Degree (after they graduate). While this is entirely reasonable and understandable, it does mean that trying to

get them interested in Physics (over the summer) is difficult. Do you have any advice to a Physics faculty who would like to get involved?

Kent
Yes. Many students that come to Fisk University do come with the intent of going to medical school. Interestingly enough Fisk programs like the first rocket team have members that are biology premed that participate. In some cases students gain new interests and change their major. I personally also explain that a student who has a physics degree could still apply to medical school. They simply need to take the appropriate prerequisites for medical school as their elective classes such that they will be prepared for the MCAT. The key is to provide students with interesting and engaging projects that can draw their interest towards other subject matter in physics. A student cannot aspire to things that they do not know. So it's incumbent upon the physics instructor to expose students to the physics principles that are involved in medicine. Many times students are dissuaded from majoring in physics because of the math, so it is important to help alleviate the fear of math. To create an appreciation of it, and a feeling of scientific identity which can boost their self efficacy in math related curriculum. When a student believes they can be a full participant, it becomes much easier to attract them to the physics major.

10. How can we create an environment and system in academia where DEI, outreach, department-specific social work, etc. would count towards scientific "progress" (e.g., towards PhD degree completion, faculty promotions)? Financial support is great, but how can the time that people put into these types of work be counted? Do you think that this type of structure would encourage more people to be involved in such work without them feeling like they would need to give more of their time and potentially extending their other research timelines?

RC: Applied physics encapsulates the value of physics to society at large (i.e., the interdisciplinary impact of physics) and can fill this role naturally as well as providing a rigorous and incredibly useful way to teach physics and train the next generation of scientists. In the broadest sense, physics already has this valuable functionality in its DNA, but is not much utilized in most curricula. Nor are many departments set up to reach out to other disciplines (other than teaching introductory service courses to pre-meds and engineering students). This may be because academia still has a somewhat rigid 'disciplinary' imprint from the distant past. Until we arrive at the point where the barriers between disciplines are < kT, the enormous interdisciplinary reach of physics could be more highly appreciated, and utilized more effectively, to create the kind of environment in our physics departments where the values listed in Q10 are seen as an integral part of doing physics.

11. While change starts at the department level, have any of the panelists been successful in making common cause with other departments in the physical sciences (math, chemistry, geoscience, etc.) at your institutions, whether at the student or the faculty level?

RC: The Applied Physics program at Michigan was established expressly for this purpose. It reaches out to faculty and students in a dozen departments and six schools (Arts and Sciences, Business, Medical, Engineering, Public Health, and Policy) across the Ann Arbor Campus to promote interdisciplinary research and teaching. Since there are numerically far more faculty with physics PhDs on the whole campus than in the Physics Department alone, the multiplicative impact is something like 4x, and needless to say a lot more than the sum of the parts.

SK: Yes, most notably when a new Applied Physical Sciences department was being formed here some years ago, its lack of traditions meant its faculty search protocols could be invented from scratch, and a few of us who had met serving as our departments' diversity liaisons worked together with the chair of the first APS faculty search and other likeminded faculty to create a set of best practices that were well received and (according to committee member interviews by the search chair afterward) most likely affected the outcome. While I can't say that Physics or any other UNC department has since adopted all the new protocols, the experiment did help raise awareness of certain best practices that have been fairly widely adopted (unconscious bias training, careful rubric design) and also led to some top-down Dean's office level attention to promoting these practices.

12. What strategies can you recommend for impelling senior university leadership beyond the department level to actually take meaningful action on equity issues?

RC: don't know about 'impelling', but unless the senior leadership begin to see equity as an existential issue for their institution, it won't be taken seriously. How to get there? We must insist on appointing senior leadership who have this as a priority from department chairs to associate deans on and up. The political challenges are severe for many public institutions. Financial retribution is all too commonly applied through reduced state appropriations to keep some of the more progressive approaches in check. Vote early and vote often!

13. For Hall and others: How important are student colleagues to promoting support for Black students? What role can a department play in making sure the climate among students is important?

ZH: This is very important here, especially for grad-to-undergrad. I recruited other graduate students, some white and some BIPOC, to help me plan and design the program.

RC: Agree -it's absolutely essential. Establishing trust can only be achieved with the endorsement of the student community. Our students are our best and most trusted ambassadors.

14. What institutions can provide leadership in gender and LGBT DEI initiatives when no majority institutions exist for queer students as there are HBCUs and indigenous institutions? Have there been initiatives with historically women's colleges as well? What about students whose identities are at the intersection of these?

Kent

These are important questions. The first thing that I would say is to identify a faculty member that is empathetic to LGBT DEI issues. I realize that that is not entirely easy. If one cannot find a faculty member with in physics or astronomy, try to find an individual who was a faculty member or administrator in another part of the institution. That person can help to facilitate dialogue in the other disciplines. There needs to be more dialogue so that there is understanding throughout the faculty administration and students of the experiences of these populations. Things can progress organically, but progress must be intentional. Understanding and community must be intentional. At the end of the day there need to be champions in the student body and in the University administration and faculty that will take up the cause. Identifying those individuals might

be the largest hurdle. However, just because it's a challenge does not mean that it should not be pursued. In fact, it suggests it that much more important. Equality!

ADDENDUM

SK: Casey Miller had a question in the Chat that never made it into the webinar Q&A, asking whether the APS National Mentoring Community is having an impact. I'll give a purely anecdotal answer. I am signed up to mentor two NMC mentees, both of whom I invited to join the NMC with me. The NMC did not introduce us, nor has it done much to keep us interacting – there is no software to generate reminders for example. I did attend an NMC conference "together" with one mentee, but we didn't interact during it, as students and faculty were mostly in different sessions. We also attended an NMC Meetup where there were more mentors than mentees, despite free food vouchers. Overall, my anecdotal impression is that the NMC is not yet a game changer, but it can motivate people to formalize a mentoring relationship that would otherwise be informal, which may be important to help keep the relationship going. Also, I personally learned some useful things at the conference I attended that I incorporated into the G2U mentor training. So it's a good thing, and working out some of the details may enhance its impact.