# Student Profile: Cedric Wilson

by Sandi Miller

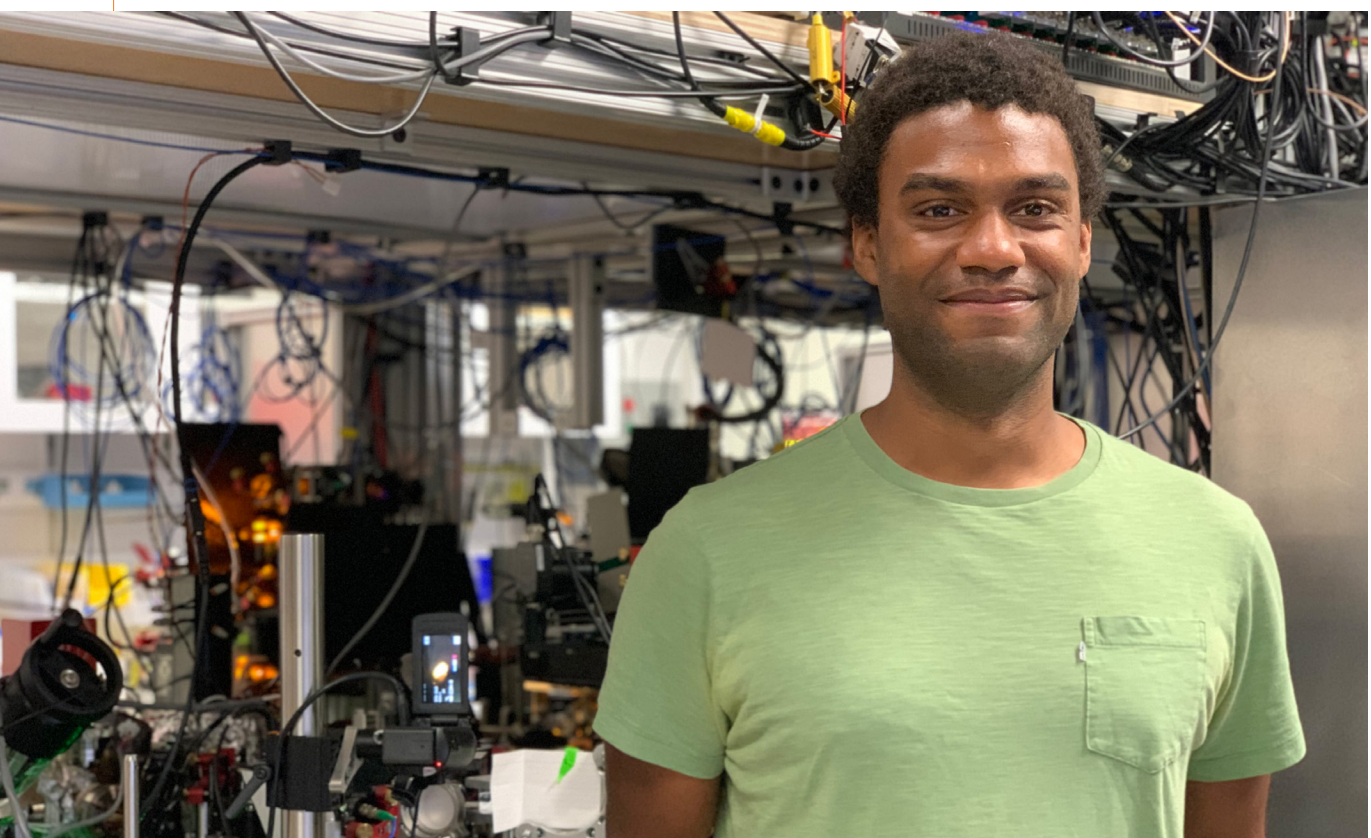
## PhD Candidate, Experimental Atomic Physics (Zwierlein Group)

Cedric Wilson is a fifth-year PhD student in the Ultracold Quantum Gases Group within the MIT-Harvard Center for Ultracold Atoms (CUA), led by Thomas A. Frank (1977) Professor of Physics Martin Zwierlein. There, Cedric is playing a key role in a groundbreaking experiment studying fast-rotating Fermi gases.

Cedric was nominated for a Hugh Hampton Young Fellowship, sponsored by the MIT Office of Graduate Education (OGE), for his academic and scientific accomplishments and service to others. Cedric also worked with the OGE to overhaul the MIT Summer Research Program (MSRP), improving research opportunities for underrepresented students. The MSRP gives students from underrepresented backgrounds a chance to come to MIT to do summer research. Cedric was an application reviewer for the MSRP and knew it was a great program with potential for improving diversity in physics. In fact, this year the MSRP tripled the number of incoming students.

Cedric has also helped to improve diversity and inclusion efforts within the CUA, and in December 2020 he was active in

Credit: Airlia Shaffer



launching the Harvard-MIT National Society of Black Physicists (NSBP) chapter. The CUA's NSBP members are exploring what kinds of outreach they're interested in and some have been mentoring students from a local high school. Initially, Cedric was the NSBP's only graduate student member, but now there are four. He notes that for underrepresented physicists, it's really important to have support, networking, and to be able to think of yourself as a physicist.

**Cedric, what attracted you to physics and MIT?**

As a kid I didn't think science was a job you could have. After high school, I didn't plan to go to college. I worked jobs that weren't the most exciting, like construction and restaurant work, but I learned the value of a good work ethic in getting things done.

My grandmother always encouraged me to give college a try. She was a nurse, and she inspired me to study medicine. I took classes in community college and then at the University of Utah. My pre-med chemistry class was awesome. That was my first experience with the world of physics. If you have an idea of how nature works, you can use that to figure out how to do things. For example, molecular structure tells you why alcohol is better than water at cleaning oil stains. Learning about a way to describe nature gave structure to my life. I thought, "This is the most fun I have had in a class and I'd rather do physics."

I didn't expect to get into MIT and almost didn't apply. I had a positive interaction with my advisor when choosing schools so that was what drew me here. I also like the style of MIT. It's not flashy; most of the effort goes toward research.

Ten years ago, if you asked me what I'd be doing, I wouldn't have guessed I'd be here. It's comforting to think you aren't stuck somewhere if you change your focus as an adult.

**Can you explain a bit more about your research?**

We're interested in rotating quantum gases. Quantum gases are made up of atoms that have been cooled to very low temperatures and have reached a temperature low enough that the atoms actually begin to "overlap." At this point there is a transition to unusual states of matter. We rotate the gases, which are electrically neutral, to create an artificial magnetic field for the atoms. The physics of rotating neutral particles is exactly analogous to the physics of charged particles in a magnetic field. We then have a window into the physics of unusual quantum states in magnetic fields, which we can image directly with a high-resolution microscope.

We get to work at extremes–weird states of matter that only show up a millionth of a degree above absolute zero. That's pretty amazing already. Then we get to manipulate those states and use them to answer fundamental questions. I also enjoy working with my hands, so working with optics and electronics is fun for me.

**What are some key 'take-aways' from your MIT experience, thus far?**

I think the most valuable lesson I learned in grad school is not about physics, but how to deal with situations where something goes wrong. Being able to trust in my reasoning and stick with an idea even when it doesn't work the first time is very important. On the other side, you have to know when to move on, so you don't waste time. There's a delicate balancing act between those two extremes.

In future, I could see myself enjoying teaching. I have also thought a lot about working in industry with research and development of quantum materials, quantum computing, optical technologies.