

A Quantum Leap

Physics major, McNair Scholar is Harvard-bound

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TAN DAO '21 WORKING IN A UNH LAB. (PHOTO: ALI ASGHAR)

Tan Dao '21 is the first to admit that there have been times it's been hard to stay academically motivated, completing his college degree during the pandemic. A [physics](#) major in the [College of Engineering and Physical Sciences \(CEPS\)](#), he's accustomed to hands-on classes and lab experiments. Last summer, he had to watch a prestigious internship at the Lawrence Berkeley National Laboratory in California, where he had planned to work on electron beam physics, evaporate. But his motivation got a big boost in February, when he learned he had been accepted into Harvard University's doctoral program in physics, consistently ranked among the best in the world.

Dao's doctoral studies will focus on quantum materials, which he describes as materials whose properties can only be described by complex quantum physics — for example, two-dimensional materials such as graphene or high-temperature superconductors. "It's condensed matter physics," he says. "Basically, that's the study of testing materials and studying their properties under extreme conditions: low temperatures or high magnetic field, for example, or the study of materials at the atomic level. It's my favorite field of physics because it has both fundamental value and lots of real-world applications."

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Soft-spoken and unassuming, Dao says he was "surprised" to hear from Harvard. Assistant physics professor Shawna Hollen, who has worked with Dao in her research lab since he was an [Upward Bound](#) student fresh out of Manchester (NH) Central High School, was less so. She recalls that when she first met him, she had limited expectations for what he would be able to accomplish, not yet in college and given only a month to contribute, only to quickly discover that those expectations were "way off."

"What really makes Tan stand out is his mature approach to problem-solving," Hollen says. "On several occasions, he's demonstrated especially creative solutions to experimental problems he has encountered in the lab, which is a completely different skill set than his obvious talent in pure academics. I'm very impressed with all he's accomplished and happy to see him be rewarded for his efforts."

At Harvard, that reward will include not only funding for his doctoral studies, but also a prestigious fellowship. Offered to just six accepted students in the graduate physics program each year, Dao's James Mills Peirce Fellowship will provide him with an additional \$18,000 over three years on top of his doctoral stipend.

Dao is quick to credit three physics professors with whom he has worked closely at UNH for their role in his considerable success: Hollen, Jiadong Zang and Maurik Holtrop. He also acknowledges the role UNH's [McNair Scholars Program](#) has played in preparing him for graduate study. A federally funded TRIO program, McNair prepares talented and highly motivated undergrads from disadvantaged backgrounds for doctoral programs in any field of study by building their research experience.

"Ever since professor Hollen introduced me to the McNair program three years ago, grad school has been in the back of my mind as an idea to keep open," Dao says. "McNair has provided me with a variety of opportunities that I took advantage of, including research." In fact, when last summer's planned internship at the Lawrence Berkeley lab fell through, Dao was able to apply his McNair funding to a position in Zang's group.

Now 21, Dao moved to the United States at the age of 11 with his parents and two older sisters to join his grandparents, who were already settled in New Hampshire — his

grandfather had fought with American troops during the Vietnam War. He learned English along with all of his other school subjects, and as far back as middle school knew his primary interests were in science and math.

Dao is not the only current senior whose four years in the physics department have opened the doors to a bright future; one of his best friends is headed to Caltech (“the best in the world for space science,” he notes). “Overall, the physics department does an exceptional job preparing our students for graduate school,” says Hollen. “Other recent graduates have gone to Cornell, Harvard and Stanford, which are some of the best graduate schools in the country for physics.”

Because of COVID, Dao has yet to visit the Harvard campus, but is looking forward to doing so before classes start in September. He was able to get home to Manchester recently to share his news with his family, and says they’re happy for him — especially his grandfather. “He wants me to show him the Harvard campus once COVID restrictions are lifted,” he says.

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[Kristin Waterfield Duisberg](#) | Communications and Public Affairs

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