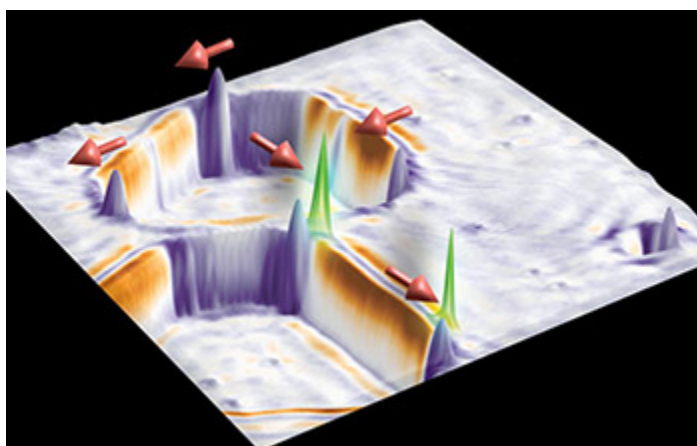




Research News

Mysterious Majorana quasiparticle is now closer to being controlled for quantum computing

Researchers detect a robust Majorana quasiparticle and show how it can be turned on and off



A scanning tunneling microscope visualizes Majorana quasiparticles, represented by green peaks.

[Credit and Larger Version \(/discoveries/disc_images.jsp?cntn_id=298839&org=NSF\)](/discoveries/disc_images.jsp?cntn_id=298839&org=NSF)

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The fame of the Majorana particle stems from its strange properties -- it is the only particle that is its own antiparticle -- and from its potential to be harnessed for future quantum computing.

In recent years, a handful of groups including one from Princeton, have [reported \(/cgi-bin/good-bye?https://discovery.princeton.edu/2019/06/13/mysterious-majorana-quasiparticle-is-now-closer-to-being-controlled-for-quantum-computing/\)](https://discovery.princeton.edu/2019/06/13/mysterious-majorana-quasiparticle-is-now-closer-to-being-controlled-for-quantum-computing/) finding the Majorana quasiparticles in various materials, but the challenge is how to manipulate them for quantum computation.

In a new study published in the journal *Science*, the NSF-supported Princeton team reports a way to control Majorana quasiparticles in a setting that also makes them more robust. The setting combines a superconductor and an exotic material called a topological insulator to make Majoranas especially resilient against destruction by heat or vibrations from the outside environment. The team also demonstrated a way to turn the Majorana on or off by using small magnets integrated into the device.

"Understanding and controlling the properties of novel electronic materials is key to future advances in many areas of science and technology, such as quantum computing," said Tomasz Durakiewicz, a program director in NSF's Division of Materials Research, who [awarded <https://www.nsf.gov/awardsearch/showAward?](https://www.nsf.gov/awardsearch/showAward?)

[AWD_ID=1608848&HistoricalAwards=false](#)> the study. "The ability to control Majoranas is a truly transformative achievement."

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