|  |  |  |  |
| --- | --- | --- | --- |
| Testo di partenza  \*non tradurre il testo evidenziato in giallo | Testo tradotto dal candidato | Spazio a disposizione del correttore | Penalità |
| **Quirky Quantum Tunneling Observed** |  |  |  |
| A new study finds observational evidence of Klein tunneling, a strange phenomenon that enables particles to pass through even the toughest barriers |  |  |  |
| Imagine you are walking and encounter a barrier, such as a hill or a wall. The only way to make it to the other side is to climb all the way up and over it. Yet what if you had the same superpowers as quantum particles? |  |  |  |
| The strange laws of quantum mechanics allow particles to sometimes bust through barriers like they are not there, even if the particles cannot climb over whatever is in their path. |  |  |  |
| But the challenge of tunneling through these barriers increases as the roadblocks get taller, making it so that fewer particles can break through. A special case of quantum tunneling called Klein tunneling, however, changes the game. |  |  |  |
| It effectively makes barriers transparent, opening up portals that allow particles to pass through, even when incredibly tall walls stand in their way. |  |  |  |
| Nearly 100 years ago, Swedish physicist Oskar Klein first predicted this phenomenon. Yet until recently, scientists had seen very limited signs of it. In a [study](https://www.nature.com/articles/s41586-019-1305-1" \t "_blank) published in *Nature* on June 19, an interdisciplinary team of researchers present direct evidence of Klein tunneling. |  |  |  |
| **Accidental Discovery** |  |  |  |
| The study is not the first to directly observe this effect. “Klein tunneling has been pretty well demonstrated in graphene,” a carbon-based material, says David Goldhaber-Gordon, a physicist at Stanford University who was not involved with the study. |  |  |  |
| Before that finding, “people had not really thought about” searching for experimental evidence of Klein tunneling and had “put it on a shelf,” says Ichiro Takeuchi, a materials scientist and engineer at the University of Maryland, College Park, and senior author of the new study. |  |  |  |
| “The results of the current work are more direct,” however, than those found in the graphene research, says Boris Nadgorny, a physicist at Wayne State University in Detroit, who was not involved with the study. The researchers also used an “ingeniously designed experimental setup,” he says. |  |  |  |
| “I would call this groundbreaking,” says Teun Klapwijk, a quantum nanoscientist at the Kavli Institute of Nanoscience at the Delft University of Technology in the Netherlands who was not involved in the research, “because it is a phenomenon that one might on paper expect to occur… but one has to hit on an experimental system which convincingly shows the phenomenon.” |  |  |  |
| This particular experiment stands out as “a clear case of independent experimental exploration and thinking,” he adds. |  |  |  |
| The finding is perhaps even more stunning because the researchers did not set out to observe this phenomenon in action. “This project stemmed out of our research on topological insulators,” says Johnpierre Paglione, a physicist at the University of Maryland and a co-author of the study. |  |  |  |
| Topological insulators are strange materials with insulated interiors but conductive surfaces. |  |  |  |
| For the past several years, he and his colleagues have studied a material called samarium hexaboride and worked to show that it is a topological insulator. They were looking for signs that samarium hexaboride exhibits quantum behavior, an important aspect of proving that a material is, indeed, a topological insulator. |  |  |  |