

Science

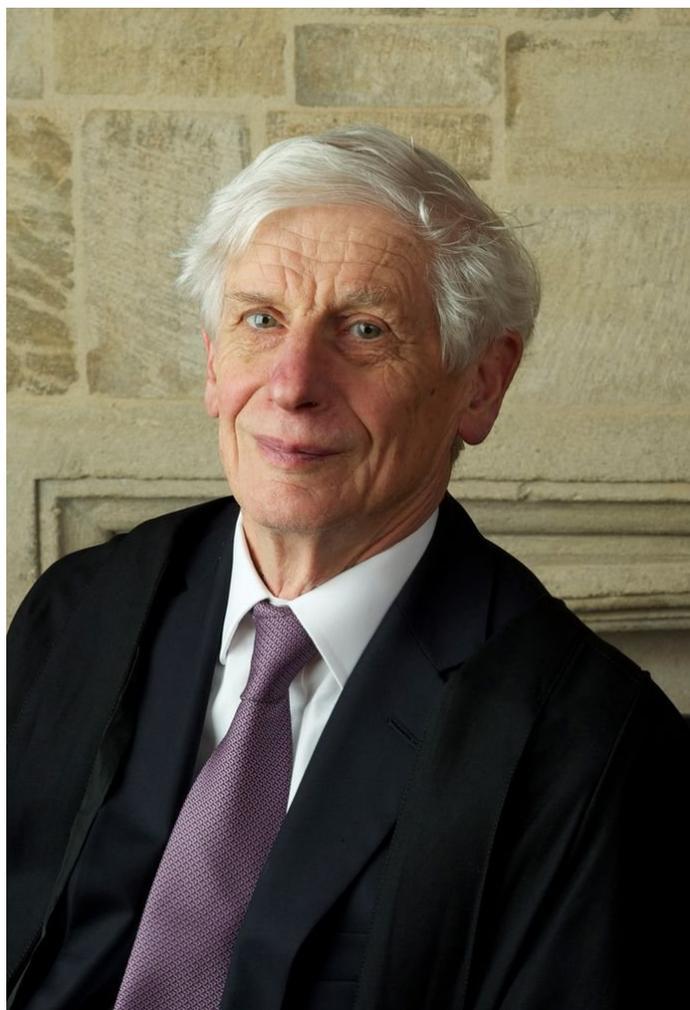
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UW emeritus professor, 'a brilliant physicist,' wins Nobel Prize for breakthroughs on matter



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1 of 3 David James Thouless, a University of Washington emeritus professor of physics and one of the winners of the 2016 Nobel Prize in physics. (©Trinity Hall, University of Cambridge photographer Kiloran Howard)

The mathematician was honored alongside Duncan Haldane and Michael Kosterlitz for discoveries made in the 1970s and '80s.

By [Christine Clarridge](#)  and [Sandi Doughton](#) 

Seattle Times staff reporters

A University of Washington professor [is among three scientists](#) awarded the Nobel Prize in physics on Tuesday for work that could result in improved materials for electronics or quantum computers.

David Thouless, an 82-year-old professor emeritus at the UW, was honored along with Duncan Haldane and Michael Kosterlitz for breakthroughs they made in the 1970s and '80s about exotic states of matter.

“Professor Thouless’ work is a perfect example of why curiosity-driven basic science is so vital,” said UW President Ana Mari Cauce. “Not only did his discoveries open up entirely new fields of research, but they also have had implications for the electronic devices that power our world today and those that may do so in the future — everything from advanced superconductors to quantum computers to other applications we can hardly imagine.”

The Royal Swedish Academy of Sciences said the trio’s work [opened the door](#) to a previously unknown world where matter can assume what was then considered to be unusual states or phases.

Nobel judges often honor discoveries made decades ago to ensure they withstand the test of time.

The Nobel scientists’ discoveries have brought about breakthroughs in the theoretical understanding of matter’s mysteries and created new perspectives on the development of innovative materials, the academy said in a statement.

The 8 million kronor (\$930,000) award was divided, with half going to Thouless and the other half to Haldane and Kosterlitz for “theoretical discoveries of topological phase transitions and topological phases of matter.”

“They have used advanced mathematical methods to study unusual phases, or

states, of matter, such as superconductors, superfluids or thin magnetic films,” according to the academy. “Thanks to their pioneering work, the hunt is now on for new and exotic phases of matter. Many people are hopeful of future applications in both materials science and electronics.”

Hiring Thouless in 1980 was a coup for the UW, said his colleague John Rehr, also an emeritus professor. “He was very highly regarded,” Rehr said in a phone interview from Stockholm, where, by “cosmic coincidence,” he’s participating in a scientific program and was able to attend one of today’s Nobel presentations.

“I was thrilled at the news,” Rehr said.

The two men met in the 1960s, after Thouless earned his doctorate at Cornell under Nobel laureate and Manhattan Project luminary [Hans Bethe](#). In his 20s, Thouless had already authored a book on quantum physics that was considered a bible in the field, Rehr recalled.

“He’s a brilliant physicist.”

That brilliance kept his colleagues on their toes.

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“When you asked him a physics question, he would not just answer at a pedestrian level,” Rehr said. “He would think about it for a minute or two and give you a really deep response.”

The Nobel citation recognizes two branches of the field of topology — theory and materials. That half the prize money went to Thouless reflects his major contributions in both arenas, Rehr pointed out.

“It was really unusual in that the theories predicted these phenomena before they were found experimentally, and it was done by a combination of brilliant mathematics and completely solid physical arguments,” he said.

Kosterlitz and Thouless' findings overturned the prevailing theory at the time that superconductivity or superfluidity could not occur in thin layers, the academy said.

Thouless is unable to grant interviews due to medical reasons, a UW spokesperson said in an email. But his son, Michael Thouless, a professor of engineering at the University of Michigan, issued a statement saying that his father was "moved and honored to learn of the Nobel Prize."

In a [statement explaining Thouless' work](#) released on Tuesday, the UW said, "Topology is the branch of mathematics dealing with properties that change in a stepwise fashion. And it turns out that the promise of new materials and methods for manipulating matter lie within these 'flatlands,' where quantum mechanics is exposed and matter assumes more 'exotic' states than the typical solid, liquid or gas. Their theories and practices have revealed new ways to understand physical interactions in this 'exotic' state."

In the flattened, 2-D realm of their investigations, these scientists were able to describe new and unique behaviors of physical matter under these conditions.

"It is the foundation for new technologies we are exploring today, using 2-D surfaces using graphene and other 'new materials,'" said Marcel Den Nijs, a UW professor of physics who has known Thouless for 35 years. "This award was a long time coming. He's a brilliant scientist and wonderful person."

Robert Stacey, dean of the UW College of Arts & Science, said Thouless' work "epitomizes the University of Washington's deep commitment to world-class research that stretches our understanding of exotic matter and the complex universe around us. And it reminds us how important fundamental scientific research and education are to our society, even when the practical applications of such research take decades to emerge."

Thouless has received many awards and honors for his work. He became a Fellow of the Royal Society in 1979 and, in 1981, a Fellow of the American Academy of Arts and Sciences. In 1987, he became a Fellow of the American Physical Society and earned the prestigious Wolf Prize for Physics in 1990.

Thouless was born in Bearsden, Scotland, and studied at Winchester College and Trinity Hall, Cambridge. He earned his doctorate at Cornell University, did his postdoctoral studies at the University of California, Berkeley, and was a professor of mathematical physics at Birmingham University in the United Kingdom before joining the UW.

Thouless retired from the UW in 2003. His wife, Margaret, also worked at the UW in the field of pathobiology. A UW official said the couple recently moved back to the U.K.

Christine Clarridge: cclarridge@seattletimes.com or 206-464-8983. Information from The Associated Press is included in this report.

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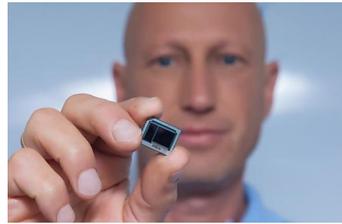
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