

Famous 40-Year-Old Math Problem Solved

For some, spending more than three years working to solve a more than 40-year-old math problem sounds like a nightmare. For University of Missouri-Columbia mathematics professor Steve Hofmann, solving a problem posed by one of the most famous mathematicians in the second half of the 20th Century has been a dream since his college days.

The major mathematical accomplishment is earning him significant recognition. Hofmann has a speaking invitation at this summer's meeting of the International Congress of Mathematicians in Madrid, Spain, which takes place only once every four years.

"It's a problem that has interested me since I was a graduate student," Hofmann said. "It was one of the biggest open problems in my field and everybody thought it was too hard and wouldn't be solved. I had toyed with it for years and then put in three years of very serious work before hitting the key breakthrough."

The problem goes back to two papers written by Tosio Kato, University of California-Berkley, in 1953 and 1961. It turned out to be quite difficult and became known as the "Kato Conjecture" in mathematical circles. The one dimensional version of the problem was solved 20 years later.

"I think I was the last person working on it," Hofmann joked. "I think everyone else had given up."

Hofmann admits explaining the problem is difficult because it is rather technical. Its solution applies to the theory of waves propagating through different media, such as a seismic wave traveling through different types of rock. Hofmann said the solution allows mathematicians to better describe the behavior of waves traveling through a medium which itself changes over time.

"To work on a problem for three years and finally crack it open feels fantastic!" Hofmann said. "It's the reason mathematicians work on problems – for moments like that."

Hofmann's work is funded by the National Science Foundation. The solution to the "Kato problem" is detailed in a series of papers published with his research collaborators Pascal Auscher, Michael Lacey, John Lewis, Alan McIntosh and Philippe Tchamitchian.

Source: University of Missouri-Columbia

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