Highest Honor in Mathematics Is Refused

By KENNETH CHANG

Grigori Perelman, a reclusive Russian mathematician who solved a key piece in a century-old puzzle known as the Poincaré conjecture, was one of four mathematicians awarded the Fields Medal today.

But Dr. Perelman refused to accept the medal, as he has other honors, and he did not attend the ceremonies at the International Congress of Mathematicians in Madrid.

"I regret that Dr. Perelman has declined to accept the medal," Sir John M. Ball, president of the International Mathematical Union, said during the ceremonies.

The Fields Medal, often described as mathematics' equivalent to the Nobel Prize, is given every four years, and several can be awarded at once. Besides Dr. Perelman, three professors of mathematics were awarded Fields Medals this year: Andrei Okounkov of Princeton; Terence Tao of University of California, Los Angeles; and Wendelin Werner of the University of Paris-Sud in Orsay.

Dr. Perelman, 40, is known not only for his work on the Poincaré conjecture, among the most heralded unsolved math problems, but also because he has declined previous mathematical prizes and has turned down job offers from Princeton, Stanford and other universities. He has said he wants no part of $1 million that the Clay Mathematics Institute in Cambridge, Mass. has offered for the first published proof of the conjecture.

In June, Dr. Ball traveled to St. Petersburg, Russia, where Dr. Perelman lives, for two days in hopes of persuading him to go to Madrid and accept the medal.

"He was very polite and cordial, and open and direct," Dr. Ball said in an interview.

But he was also adamant. "The reasons center around his feeling of isolation from the mathematical community," Dr. Ball said of Dr. Perelman's refusal, "and in consequence his not wanting to be a figurehead for it or wanting to represent it."

Dr. Ball added, "I don't think he meant it as an insult. He's a very polite person. There was never a cross word."

Despite Dr. Perelman's refusal, he is still officially a Fields Medalist. "He has a say whether he accepts it, but we have awarded it," Dr. Ball said.

Beginning in 2002, Dr. Perelman, then at the Steklov Institute of Mathematics of the Russian Academy of Sciences in St. Petersburg, published a series of papers on the Internet and gave lectures at several American universities describing how he had overcome a roadblock in the proof of the Poincaré conjecture.

The conjecture, devised by Henri Poincaré in 1904, essentially says that the only shape that has no holes and fits within a finite space is a sphere. That is certainly true looking at two-dimensional surfaces in the everyday three-dimensional world, but the conjecture says the same is true for three-dimensional surfaces embedded in four dimensions.

Dr. Perelman solved a difficult problem that other mathematicians had encountered when trying to prove the conjecture, using a technique called Ricci flow that smoothes out bumps in a surface and transforms it into a simpler form.

Dr. Okounkov, born in 1969 in Moscow, was recognized for work that tied together different fields of mathematics that had seemed unrelated. "This is the striking feature of Okounkov's work, finding unexpected links," said Enrico Arbarello, a professor of geometry at the University of Rome in Italy.

Dr. Okounkov's work has found use in describing the changing surfaces of melting crystals. The boundary between melted and non-melted is created randomly, but the random process inevitably produces a border in the shape of a heart.

Dr. Tao, a native of Australia and one of the youngest Fields Medal winners ever at age 31, has worked in several different fields, producing significant advances in the understanding of prime numbers, techniques that might lead to simplifying the equations of Einstein's theory of general relativity and the equations of quantum mechanics that describe how light bounces around in a fiber optic cable.

Dr. Werner, born in Germany in 1968, has also worked at the intersection of mathematics and physics, describing phenomena like percolation and shapes produced by the random paths of Brownian motion.

The medal was conceived by John Charles Fields, a Canadian mathematician, "in recognition of work already done and as an encouragement for further achievements on the part of the recipient."

Since 1936, when the medal was first awarded, judges have interpreted the terms of Dr. Fields's trust fund to mean that the award should usually be limited to mathematicians 40 years old or younger.

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