

*The American Mathematical Society, together with the Mathematical Sciences Research Institute, presents...*

# The 2006 Einstein Public Lecture in Mathematics

A lecture given by **Benoît Mandelbrot**

## THE NATURE OF ROUGHNESS IN MATHEMATICS, SCIENCE, AND ART

For Plato, Euclid, Newton, and Einstein, space was smooth. The kind of roughness that is obvious in everyday situations was dismissed as too complex for scientific study. It has now become accepted that much of the apparently shapeless roughness in the real world is in fact self-similar, that it can be handled with the help of fractal “pathologies”, and also that fractals predate their use in mathematics. They have been a clearcut and remarkable feature in art since time immemorial. I will describe a grand Fractal Ring, which begins in art, progresses through pure mathematics and diverse sciences, and returns in the end to art.

—Benoît Mandelbrot  
*in his abstract for the lecture*



This will be the second public lecture in the series initiated by the American Mathematical Society in 2005 to celebrate the one-hundredth anniversary of Einstein’s “annus mirabilis”. The year 1905 marked the publication by Albert Einstein in Germany of three fundamental papers that changed the course of twentieth-century physics. Einstein later moved to the United States, where he became a founding member of the School of Mathematics at the Institute for Advanced Study in Princeton.

The lecture will take place on Saturday, April 29, 2006, at the AMS Sectional Meeting in San Francisco. It will be aimed at members of the general public, but will also be of interest to professional mathematicians.

Benoît Mandelbrot is the founder of fractal geometry. He is also an inspiring and eloquent public speaker. In his study of disparate physical, mathematical, and social phenomena, Mandelbrot has discovered remarkable order in complicated and seemingly unrelated data, thereby changing the way we look at the

world. He has thus stimulated enormous public and professional interest in the beauty and power of fractals, and in the general question of “roughness” in nature.

Benoît Mandelbrot is the Sterling Professor Emeritus of Mathematical Science at Yale University, and IBM Fellow Emeritus at the IBM Research Center. Among his many awards and honors are the Wolf Prize for Physics in 1993, the Japan Prize for Science and Technology in 2003, and the first Science for Art Prize of Moët-Hennessy-Louis Vuitton in 1988. He is a member of the American Academy of Arts and Sciences, the U.S. National Academy of Sciences, and the American Philosophical Society, and he is the recipient of numerous honorary degrees.

A handwritten signature in black ink that reads "James G. Arthur".

James G. Arthur, AMS President

For more information see  
[www.ams.org/meetings/einstein-lect.html](http://www.ams.org/meetings/einstein-lect.html)

