2012 MICHALIK LECTURE

Shing-Tung Yau has made fundamental contributions to differential geometry which have influenced a wide range of scientific disciplines, including astronomy and theoretical physics. Yau's first major contribution to differential geometry was his proof of the Calabi conjecture, which concerns how volume and distance can be measured not in four, but in five or more dimensions. In 1979 Yau and Richard Schoen proved Einstein's positive mass conjecture by applying methods devised by Yau. The proof was based on their work with minimal surfaces. In 1982 Yau was awarded the Fields Medal, the highest award in mathematics, and in 1994 he shared with Simon Donaldson of Oxford University the Crafoord Prize of the Royal Swedish Society, in recognition of his "development of nonlinear techniques in differential geometry leading to the solution of several outstanding problems." In 2010 Yau published the book *The Shape of Inner Space*.

4:00 P.M.
Friday,
October 5, 2012

Ballroom, Rm. 202
O'Hara Student Center

Free and Open to the Public

UNIVERSITY OF PITTSBURGH
The DIETRICH School of Arts & Sciences

The University of Pittsburgh
Department of Mathematics

presents

The Edmund R. Michalik
Distinguished Lecture in the
Mathematical Sciences

Professor Shing-Tung Yau

Harvard University

Geometry: from Riemann to Einstein and on to String Theory

In this talk, the concept of how space has evolved in the past one hundred fifty years since the time of Riemann will be discussed. Even some old ideas, such as the Riemann mapping theorem, are now currently being used in computer graphics. Some of the applications will be demonstrated. The ideas of Riemann were used, successfully, by Einstein in formulating new ideas about gravity that combined Newtonian theory with special relativity. In his theory of general relativity, Einstein generalized the notion of space to a 'spacetime' of four dimensions. The idea of unifying all the forces in nature was pursued by Einstein and continued by string theorists, who took physics from a four-dimensional spacetime to a ten-dimensional spacetime. The six extra dimensions, which are posited by string theory, can be called the 'inner space' of the universe, and the research that explores this hidden (and hypothetical) realm shall be reported. Much of this work is discussed in Prof. Yau's book with Steve Nadis, *The Shape of Inner Space*.

Reception Immediately Following the Lecture

This public lecture is part of an annual series in honor of Professor Edmund R. Michalik, established through a gift from the Michalik family.

For further information, email: **math@pitt.edu**
Phone: **412-624-8375**
or visit **http://www.mathematics.pitt.edu**