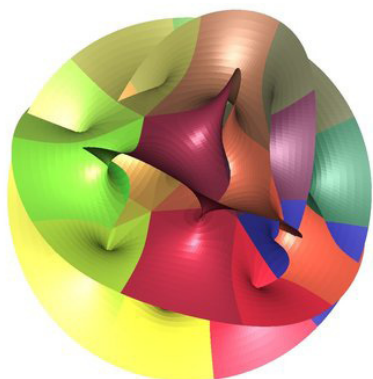Please join us for an IPAM public lecture and reception, cosponsored by
the UCLA Department of Mathematics and the Department of Physics and Astronomy

THE SHAPE OF INNER SPACE

String Theory and the Geometry of the Universe's Hidden Dimensions

Friday, January 14, 2011 • 3:00PM • Haines Hall, Room 39

One of the smallest things you can possibly imagine—six-dimensional geometric spaces that may be more than a trillion times smaller than an electron—could, nevertheless, be one of the defining features of our universe, exerting a profound influence that extends to every single point in the cosmos. In his book, Yau tells the story of those spaces, which physicists have dubbed "Calabi-Yau manifolds." Yau managed to prove the existence, mathematically, of those spaces, despite the fact that he had originally set out to prove that such spaces could not possibly exist. This mathematical proof, which had initially been ignored by physicists (partly because it was steeped in difficult, nonlinear arguments), nevertheless made its way into the center of string theory, which now stands as the leading theory of the universe and our best hope yet of unifying all the particles and forces observed—and yet to be observed—in nature.
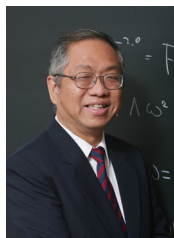
presented by
Shing-Tung Yau
Professor of Mathematics, Harvard
Director, Institute of Mathematical Sciences, Chinese University of Hong Kong

Yau's work has impact in both physics and mathematics. Calabi-Yau manifolds are among the 'standard toolkit' for string theorists today. His proof of the positive energy theorem in general relativity demonstrated—sixty years after its discovery—that Einstein's theory is consistent and stable. His proof of the Calabi conjecture allowed physicists—using Calabi-Yau compactification—to show that string theory is a viable candidate for a unified theory of nature. In recognition of his many accomplishments, Yau has also received a number of awards and prizes, including the Fields Medal (1982), a MacArthur Fellowship (1984) the Crafoord Prize (1994), the U.S. National Medal of Science (1997), and the Wolf Prize in Mathematics (2010). Yau's book, *The Shape of Inner Space: String Theory and the Geometry of the Universe's Hidden Dimensions*, was published earlier this year with co-author Steve Nadis.

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