



# Frontiers of Mathematics Lecture

## Recent development in Conformal Geometry

### Abstract

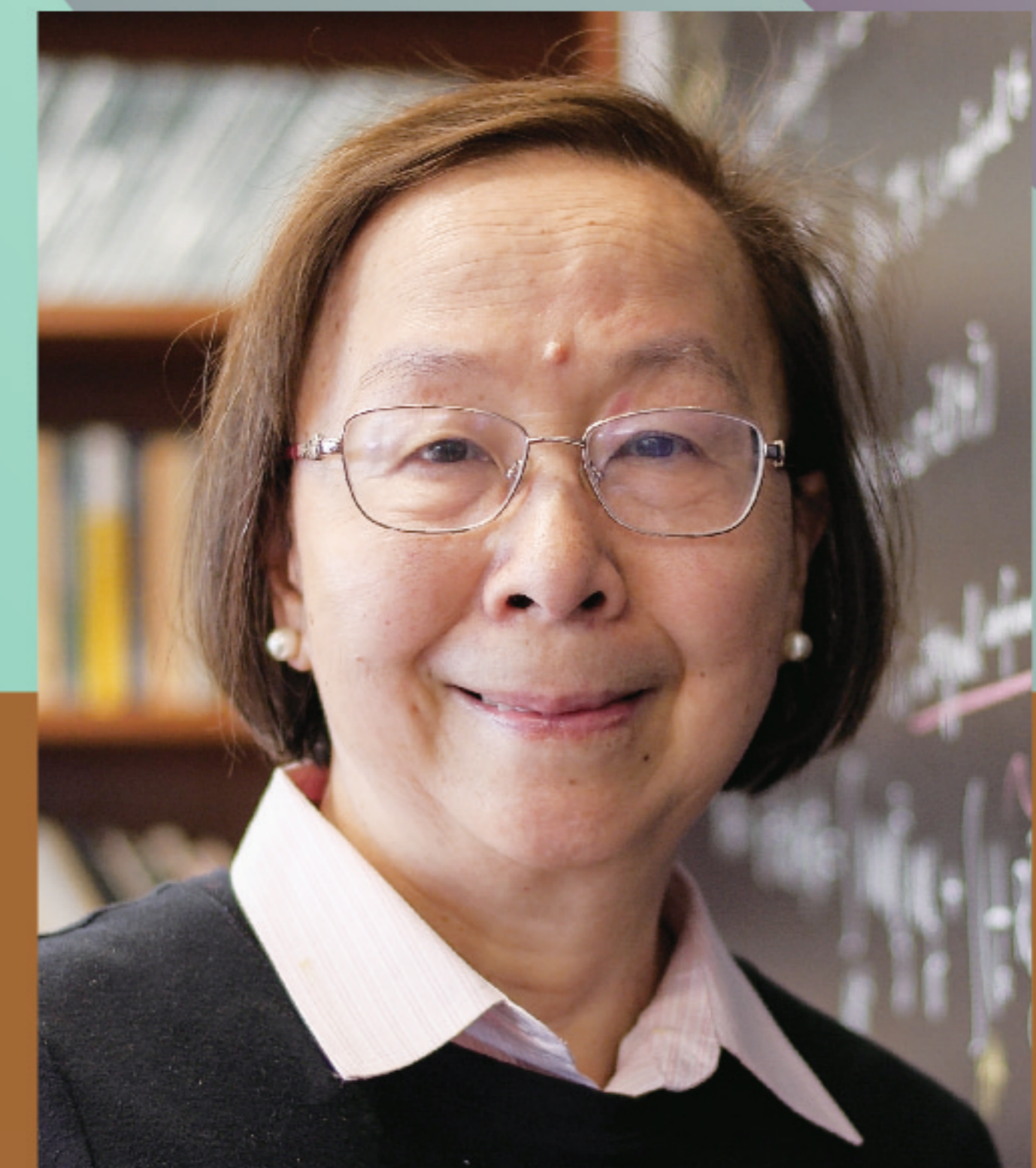
This will be a survey talk of some recent development in conformal geometry. In this talk, conformal refers to the “angle-preserving” property. In a Riemannian manifold  $M$  with a metric  $g$ , the conformal class  $[g]$  of  $g$  denotes the class of such metrics  $\hat{g} = \rho^2 g$  by smooth functions  $\rho$  in  $M$ . One of the main goals in conformal geometry is to study geometric quantities which are invariant in the  $[g]$  in either pointwise or integral sense together with their geometric and topological implications.

In the talk, topics I will cover include:

**PDE aspects:** Starting in the late 1970, Second order elliptic operator was used in the study of the celebrated “Yamabe problem” – study of the scalar curvature. I will explain the role played by higher order linear GJMS operators and fully non-linear operators in recent years.

**Non-local invariants:** GJMS operator was generalized to the fractional setting on the boundary of asymptotic hyperbolic manifolds via the scattering theory. One quantity well studied in this setting is the concept of “Renormalized Volume” introduced by Graham-Witten. I will report the connection of this concept to the PDE aspect above and the active research project currently going on.

As an application, I will discuss progress made on the problem of “conformal filling in” in ADS/CFT theory. Given a manifold  $(M^n, h)$ , when is it the boundary of a conformally compact Einstein manifold  $(X^{n+1}, g)$ , in the sense that there exists some defining function  $\rho$  on  $X$  so that  $\rho^2 g$  is compact on the closure of  $X$  and  $\rho^2 g$  restricted to  $M$  is the given metric  $h$ ? The model example is the  $n$ -sphere as the conformal infinity of the hyperbolic  $(n+1)$  ball.



**Professor  
Sun-Yung Alice Chang**  
*Princeton University, USA*

### Biography

Professor Sun-Yung Alice Chang is Eugene-Higgins Professor of Mathematics at Princeton University. Prof. Chang is a leading expert in mathematical analysis. She started her research career studying problems in classical harmonic analysis and gradually shifted to fields including conformal geometry and intersections with non-linear partial differential equations. She received her B.S. from National Taiwan University in 1970 and her Ph.D. from University of California at Berkeley in 1974. She was formerly Professor at UCLA and UC Berkeley before joining Princeton in 1998. Prof. Chang is Fellow of the US National Academy of Sciences, Member of the American Academy of Arts and Sciences, Academician of Academia Sinica of the Republic of China and Foreign Member of the Royal Swedish Academy of Sciences. Among her accolades Prof. Chang was a Sloan Fellow, recipient of the Satter Prize of the American Mathematical Society, a Guggenheim Fellow and an MSRI Simons Professor. She is Fellow of the American Mathematical Society, Member of American Women in Mathematics and Doctor Honoris Causa of University Pierre and Marie Curie. She was an Invited Speaker at the International Congress of Mathematician (ICM) in 1986 at Berkeley, a Plenary Speaker at ICM 2002 in Beijing, and gave an Emmy Noether Lecture at ICM 2018 in Rio de Janeiro.

Date :

February 10, 2026 (Tuesday)

Time :

5:00 – 6:00 pm

Venue :

Lecture Theatre A, 1/F,  
Chow Yei Ching Building, HKU