THE FIELDS INSTITUTE

DISTINGUISHED LECTURE SERIES

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Ricci Flow and the Sphere Theorem

September 8 at 3:30 pm

In 1926, Hopf showed that every compact, simply connected manifold with constant curvature 1 is isometric to the standard round sphere. Motivated by this result, Hopf posed the question whether a compact, simply connected manifold with sufficiently pinched curvatured must be a sphere topologically. This question has been studied by many authors during the past decades, a milestone being the topological sphere theorem of Berger and Klingenberg. I will discuss the history of this problem and sketch the proof of the Differentiable Sphere Theorem. The proof relies on the Ricci flow method pioneered by Richard Hamilton.

Minimal tori in S^3 and the Lawson Conjecture

September 9 at 3:30 pm

In 1966, Almgren showed that any immersed minimal surface in S^3 of genus 0 is totally geodesic, hence congruent to the equator. In 1970, Blaine Lawson constructed many examples of minimal surfaces in S^3 of higher genus; he also constructed numerous examples of immersed minimal tori. Motivated by these results, Lawson conjectured that any embedded minimal surface in S^3 of genus must be congruent to the Clifford torus. In this lecture, I will describe a proof of Lawson's conjecture. The proof involves an application of the maximum principle to a function that depends on a pair of points on the surface.

New Estimates for Mean Curvature Flow

September 10 at 3:30 pm

We describe a sharp noncollapsing estimate for mean curvature flow, which improves earlier work of White and Andrews. This estimate holds for any solution which has positive mean curvature and is free of self-intersections. The estimate is particularly useful for two-dimensional surfaces in $\mathbb{R}^3$; in this case, it provides a substitute for the cylindrical estimates established by Huisken and Sinestrari in the higher-dimensional case.

About Simon Brendle

Simon Brendle is a German Mathematician and a recipient of numerous prizes, including the EMS prize for his contributions to differential geometry. He is currently a professor at Stanford University. His areas of research include : Yamabe Flow, Differentiable Sphere Theorem, Min-Oo Conjecture, and Lawson Conjecture.

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