



UNIVERSITY  
OF MANITOBA



Pacific Institute *for the*  
Mathematical Sciences

# PIMS-UManitoba Distinguished Lecture

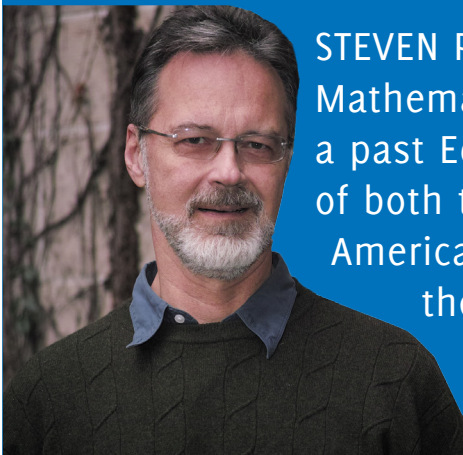
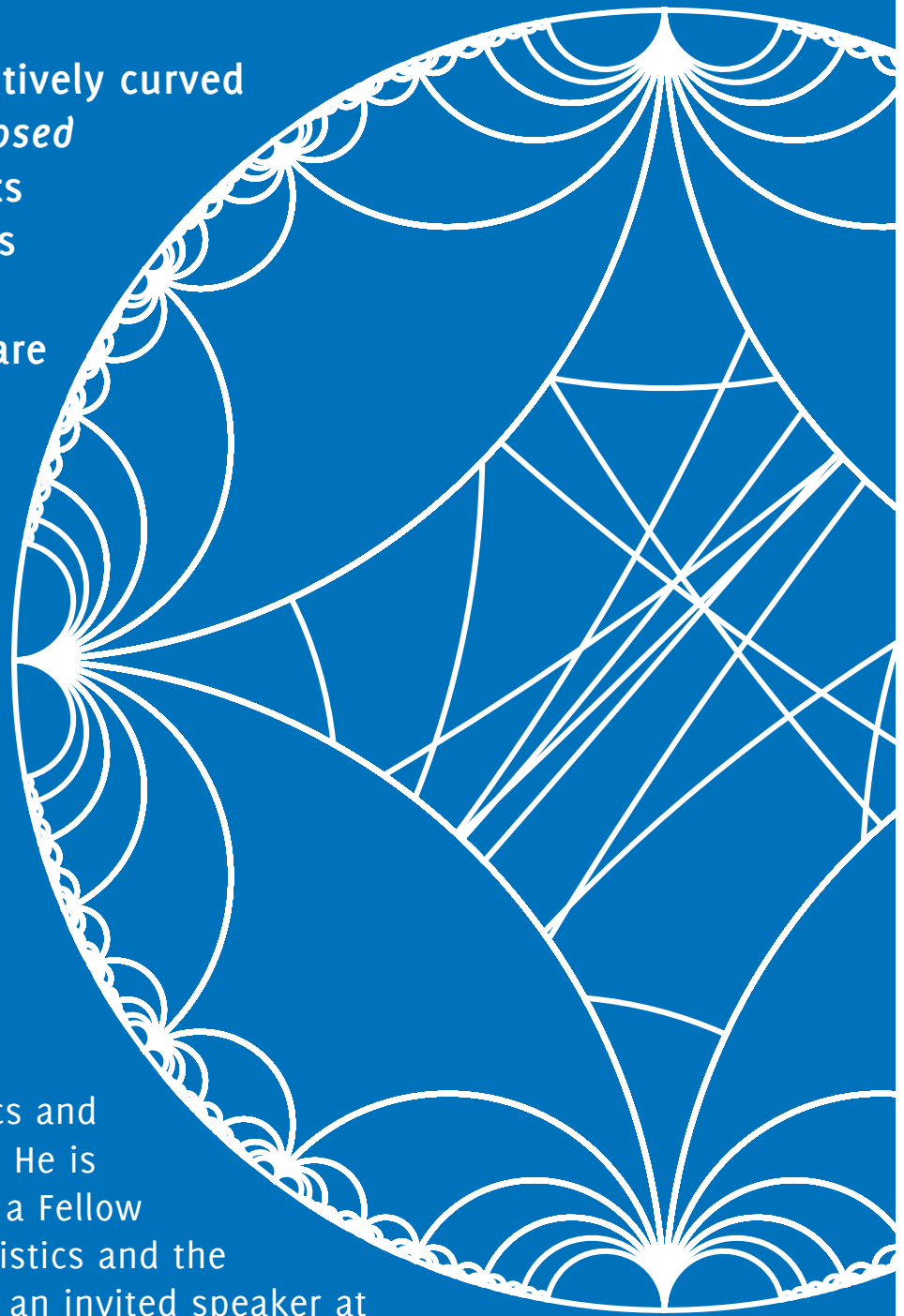
Steven P. Lalley (University of Chicago)

5 February, 2016  
2:30 pm

Robert B. Schultz Lecture Theatre  
University of Manitoba

## STATISTICAL REGULARITIES OF GEODESICS ON NEGATIVELY CURVED SURFACES

The geodesics on a sphere (the prototypical positively curved surface) are the great circles, all of which are *closed* (that is, each great circle eventually returns to its initial point, in the same direction as it left). It is a remarkable fact that on a compact, *negatively* curved surface, only countably many geodesics are closed; these form a discrete sequence whose lengths diverge to infinity. The sequence of closed geodesics on a *hyperbolic* surface (that is, a surface of constant negative curvature  $-1$ ) have remarkable number-theoretic and geometric properties, and obey striking statistical laws. I will discuss some of these in detail, with particular emphasis on the pattern of *self-intersections* of a typical closed geodesic.



STEVEN P. LALLEY is a Professor of Statistics and Mathematics at the University of Chicago. He is a past Editor of the *Annals of Probability*, a Fellow of both the Institute of Mathematical Statistics and the American Mathematical Society, and was an invited speaker at the 2006 International Congress of Mathematicians.