The 24th Takagi Lectures

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Kavli Institute for the Physics and Mathematics of the Universe
The University of Tokyo, Chiba, Japan

ABSTRACT

Joseph Bernstein: *Hidden Sign in Langlands' Correspondence*

In this note I describe some modification of the Langlands correspondence and explain why it is more natural. I will also discuss its significance to the theory of automorphic L-functions.

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Richard Schoen: *The Scalar Curvature in Riemannian Geometry and Relativity*

This survey paper centers around the geometry of Riemannian manifolds of non-negative scalar curvature. This study can be motivated either from the point of view of general relativity or from a pure Riemannian geometry point of view. In general relativity such manifolds arise naturally as spacelike hypersurfaces in physically reasonable spacetimes. As such there are physical ideas which motivate geometric theorems on this class of manifolds. In this paper we focus especially on ideas related to gravitational mass and energy. One focus of the paper is on the positive mass theorem in general dimensions and its relation to singularities of volume minimizing hypersurfaces. We also discuss applications of the positive mass theorem to compactness questions for metrics of constant scalar curvature, to uniqueness of the Schwarzschild solution as a static vacuum solution of the Einstein equations, and to the Penrose inequality relating the area of a horizon to the total mass. From a purely Riemannian geometry point of view it is natural to study manifolds of non-negative scalar curvature from either a local or global viewpoint. We compare local ideas from relativity to polyhedral comparison theorems from Riemannian geometry.