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Simon Brendle* (brendle@math.stanford.edu), Stanford University, 450 Serra Mall, Bldg 380, Stanford, CA 94305. *Curvature, sphere theorems, and the Ricci flow.*

In 1926, Hopf proved that any compact, simply connected Riemannian manifold with constant curvature 1 is isometric to the standard sphere. Motivated by this result, Hopf posed the question of whether a compact, simply connected manifold with suitably pinched curvature is topologically a sphere. This question has been studied by many authors over the past six decades, a milestone being the Topological Sphere Theorem proved by Berger and Klingenberg in 1960.

In this lecture, I will discuss the history of this problem, and describe the proof (joint with R. Schoen) of the Differentiable Sphere Theorem. This theorem classifies all manifolds with $1/4$ -pinched curvature up to diffeomorphism. The distinction between homeomorphism and diffeomorphism is significant in light of the exotic spheres constructed by Milnor; the proof uses the Ricci flow technique introduced by Hamilton. (Received March 13, 2010)