Richard Schoen

# Richard Schoen – Mathematics

The Rolf Schock Prize in Mathematics 2017 is awarded to **Richard Schoen,** University of California, Irvine and Stanford University, USA, *"for groundbreaking work in differential geometry and geometric analysis including the proof of the Yamabe conjecture, the positive mass conjecture, and the differentiable sphere theorem".*

Richard Schoen holds professorships at University of California, Irvine and Stanford University, and is one of three vice-presidents of the American Mathematical Society.

Schoen works in the field of geometric analysis. He is in fact together with Shing-Tung Yau one of the founders of the subject. Geometric analysis can be described as the study of geometry using non-linear partial differential equations. The developments in and around this field has transformed large parts of mathematics in striking ways. Examples include, gauge theory in 4-manifold topology, Floer homology and Gromov-Witten theory, and Ricci-and mean curvature flows.

From the very beginning Schoen has produced very strong results in the area. His work is characterized by powerful technical strength and a clear vision of geometric relevance, as demonstrated by him being involved in the early stages of areas that later witnessed breakthroughs. Examples are his work with Uhlenbeck related to gauge theory and his work with Simon and Yau, and with Yau on estimates for minimal surfaces.

Schoen has also established a number of well-known and classical results including the following:

- The positive mass conjecture in general relativity: the ADM mass, which measures the deviation of the metric tensor from the imposed flat metric at infinity is non-negative.
- The Yamabe conjecture: any Riemannian metric is conformally equivalent to a constant scalar curvature metric.
- Harmonic maps with applications: co-compact discrete subgroups of a rank one semi-simple group is arithmetic.
- Applications of the Ricci-flow: quarter-pinched manifolds are smooth space forms.

Richard Schoen was born in 1950 in Celina, Ohio, USA, and received his doctorate in 1977 from Stanford University, USA.

*https://profiles.stanford.edu/richard-schoen*