The Rolf Schock Prize Symposium in Mathematics

Date: 13 November 2017

Venue: Institut Mittag-Leffler, Auravägen 17, Djursholm, Sweden

13.30 Introduction

13.35 Quasilocal mass and angular momentum in general relativity
Shing-Tung Yau

In this talk, I shall explain the works that I did with Mu-Tao Wang and Po-Ning Chen on the theory of quasilocal quantities in general relativity. It solves some old problems studied by Penrose, Hawking, Brown, York and others. Many of the key technology was developed by Schoen-Yau and Witten.

14.20 Short break

14.30 Asymptotics near singularities of minimal submanifolds
Leon Simon

A brief survey of what is known about asymptotic behavior on approach to singular points of minimal submanifolds, followed by a discussion of some open questions and new work on construction of examples of minimal hypersurfaces which have isolated singularities yet which exhibit non-isolated (in fact cylindrical) tangent behavior.

15.15 Break with refreshments

15.45 The positive mass theorem revisited
Richard Schoen

We will introduce the positive mass theorem which is a problem originating in general relativity, and which turns out to be connected to important mathematical questions including the study of metrics of constant scalar curvature and the stability of minimal hypersurface singularities. We will then give a general description of our recent work with S. T. Yau on resolving the theorem on high dimensional non-spin manifolds.

16.30 Short break

16.40 Min-max theory for the area functional - a panorama
Fernando Coda Marques

In this talk we will give a current panorama of the min-max theory for the area functional, initially devised by Almgren in the 1960s and improved by Pitts (1981). This is a deep high-dimensional version of the variational theory of closed geodesics. The setting is very general, being that of Geometric Measure Theory, and the main application until very recently was the construction of minimal varieties of any dimension in a compact Riemannian manifold. In the past few years we have discovered new applications of this old theory, including a proof of the Willmore conjecture, of the Freedman-He-Wang conjecture, and of Yau's conjecture (about the existence of infinitely many minimal hypersurfaces) in the positive Ricci curvature setting. We will give an overview of these results and describe also our current efforts to understand the problem of the Morse index and multiplicity. The material covered in these lectures is based on joint work with Andre Neves.

17.25 End of symposium

The symposium is free of charge and open to the public but registration is required for all participants. Registration and more information at www.kva.se/SchockMathematics2017