Title:
"Moduli spaces of manifolds and positive scalar curvature"

Abstract:
"The question whether a given closed manifold admits a metric of positive scalar curvature has been clarified a long time ago, at least if the dimension of the manifold is at least five, if the manifold is simply connected and if it admits a spin structure. While index theory provides the obstructions to the existence of such a metric (which lie in real K-theory), constructions became possible after Gromov and Lawson showed that the problem depends essentially only on the bordism class of the manifold.

More recent investigations went one step further: we study the homotopy type of the space of metrics of positive scalar curvature on a high-dimensional spin manifold. Using the Gromov-Lawson surgery method and a fairly recent set of ideas from differential topology (the Galatius-Randal-Williams Theorem), we prove that the topology of the space of metrics of positive scalar curvature is as nontrivial as one could reasonably expect from the viewpoint of index theory. This is joint work with Botvinnik and Randal-Williams."