Uwe Semmelmann (Universität zu Köln):

Weitzenboeck formulas on manifolds with special holonomy

Weitzenboeck formulas are an important tool for linking differential geometry and topology. They may be used for proving the vanishing of Betti numbers under suitable curvature assumptions or for proving the non existence of metrics of positive scalar curvature on manifolds satisfying certain topological conditions. Moreover they are often applied in the proof of eigenvalue estimates for Laplace and Dirac operators.

In my talk I will consider Weitzenboeck formulas on Riemannian manifolds with a fixed compact structure group. I will show how one may derive all such formulas in a certain recursive procedure. It turns out that finding all possible Weitzenboeck formulas can be reformulated into a problem of linear algebra depending on the representation theory of the structure group. In the end the structure of the universal enveloping algebra of the Lie algebra of the structure group determines the existence of Weitzenboeck formulas.