

SIMPLY CONNECTED MANIFOLDS OF POSITIVE CURVATURE

The idea of this seminar is to read Stolz' Annals paper: *Simply Connected Manifolds of Positive Scalar Curvature*. There is a Bulletin paper by the same name and some lecture notes from Trieste that are some what more accessible. I propose the following outline which closely follows the Trieste notes:

- (1) Introduction.
- (2) Curvature (scalar, Ricci) and construction of scalar curvature metrics.
- (3) Bordism theorem (Thm 1.8) and Gromov-Lawson (Thm 1.10).
- (4) Atiyah-Singer-Index Theorem.
- (5) Lichnerowicz (Thm 1.11) and statement of Hitchin's refinement.
- (6) K-theory for C^* -algebras.
- (7) The index obstruction and Gromov-Lawson-Rosenberg.
- (8) An introduction to the simply connected case.
- (9) Algebraic topology:
 - (a) Cohomology operations and the Steenrod algebra.
 - (b) Spectra necessities.
 - (c) The Adams spectral sequence.
 - (d) Completing the proof of GLR in the simply connected case.

Probably Stephan would be willing to give the first talk. The next two are more geometric. Talks (4)-(7) are more analytic/index theoretic. Obviously the last talks are algebraic. If time permits there are interesting further topics: results on the non-simply connected case, the obstruction for Ricci curvature, or the space of positive scalar (or sectional) curvature metrics. However, I doubt we will have time to cover much more than the outline as some talks (e.g. (4)) may need to be split.