SEMINAR S4D4
GRADUATE SEMINAR ON ADVANCED GEOMETRY
SUMMER SEMESTER 2025

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Volume and Euler class

The goal of the seminar is to discuss various ways of looking at the Euler class of a sphere bundle over a manifold and its connection to (simplicial) volume.

REFERENCES

[BT82]   R. Bott, L. Tu, *Differential forms in algebraic topology*, Springer Graduate Text 82 (1982).
[Du03]   J. Dupont, *Fibre bundles and Chern-Weil theory*, Lecutre Notes, Aarhus 2003.
[F17]   R. Frigerio, *Bounded cohomology and discrete groups*, AMS Math. Surveys and Monographs, AMS 2017.
[KN69]   S. Kobayashi, K. Nomizu, *Foundations of differential geometry II*, Interscience 1969.

Talks:

(1) The Euler class of an oriented rank two vector bundle, examples. BT82, p.70-77.
(2) $SO(n)$-principal bundles and connections. Du03, p.21-25, 39-42.
(3) Connections and the curvature. Du03, p.43-62.
(4) Invariant polynomials and the Euler class as a characteristic class via axioms. Du03, p.83-85, KN69, p.314-320.
(5) The Euler class of a sphere bundle as an obstruction class. BT82, p.122-126, F17, p.131-136.
(6) Bounded cohomology. F17, p.53-59.
(7) Flat sphere bundles and the bounded Euler class. F17, p.145-151.
(8) The bounded Euler class and Milnor Wood inequalties. F17, p.151-154.
(9) Maximal representations of surface groups into PSL$(2, \mathbb{R})$. F17, p.162-166.