**Oberseminar Geometrie**
Department of Mathematics
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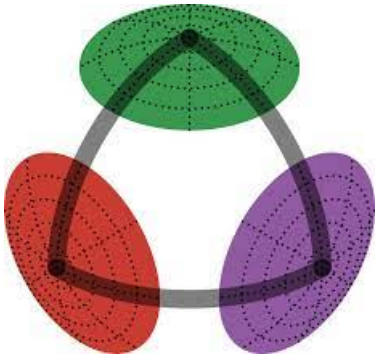

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## Geometric and analytic structures on spaces homeomorphic to a manifold

We explore geometric and analytic aspects of metric spaces homeomorphic to a topological manifold, sometimes called metric manifolds. Such spaces are prominently studied in the field of analysis on metric spaces for example in connection with parametrization problems and they also appear naturally in geometric group theory as boundaries of some hyperbolic groups.

Only assuming linear local contractibility and finite Hausdorff measure, we show that one can make sense of "integration of differential forms" on such spaces and obtain some kind of Stokes' theorem as well as an analytic analog of the fundamental class. This then allows us to use modern techniques from minimal surface theory to establish (relative) isoperimetric inequalities on metric manifolds.

As an application we can provide a conceptually simple proof of a deep theorem of Semmes about the validity of Poincaré inequalities in metric manifolds. Such inequalities form the basis for developing a robust theory of first order calculus in the setting of metric spaces.

Based on joint work with G. Basso and D. Marti.