Marie Bormann
„Functional inequalities for Brownian motion on manifolds with sticky-reflecting boundary diffusion"

Abstract: We prove geometric upper bounds for the Poincaré and Logarithmic Sobolev constants for Brownian motion on manifolds with sticky-reflecting boundary diffusion i.e. extended Wentzell-type boundary condition under general curvature assumptions on the manifold and its boundary. The method is based on an interpolation involving energy interactions between the boundary and the interior of the manifold. As a side result we obtain explicit geometric bounds on the first nontrivial Steklov eigenvalue. The case of Brownian motion with pure sticky reflection is also treated. If time permits we also discuss a Cheeger-type inequality.

Giovanni Brigati
„Nonlinear Dirichlet Forms"

Ralph Chill
„Domination of semigroups on standard forms of von Neumann algebras"

Florian Fischer
„Optimal Poincaré-Hardy inequalities on manifolds and graphs"

Abstract: We review a method to obtain optimal Poincaré-Hardy-type inequalities on the hyperbolic spaces, and discuss briefly further generalisations. Then we recall a corresponding result on homogeneous regular trees and give a new proof of it. We can use the underlying method to show optimal Poincaré-Hardy-type inequalities also on some weakly spherically symmetric graphs which include fast enough growing trees and anti-trees. Moreover, this method yields optimal weights which are larger at infinity than the optimal weights constructed via the Fitzsimmons ratio of the square root of the minimal positive Green's function. Joint work with Christian Rose.

Uta Freiberg
„Measure geometric Laplacians on the real line"

Abstract: The vibrations of a string with singular mass distribution can be described by a wave equation involving a measure geometric Laplacian instead of the classical one. We define this operator and present Weyl asymptotics for the case of self--similar as well as self--conformal mass distributions. The associated Dirichlet forms and stochastic processes will be also investigated.

Moritz Hehl
„Graphs with non-negative Ollivier-Ricci curvature"
Abstract: We introduce the Ollivier-Ricci curvature and its modification by Lin, Lu, and Yau on locally finite graphs. We establish a lower bound on the minimal degree of a graph ensuring non-negative Lin-Lu-Yau curvature, along with an analysis of the sharpness of this bound. Next, we focus on graphs that are Ricci-flat in Ollivier's notion of Ricci curvature for every choice of the idleness parameter. These graphs are known in the literature as bone-idle. We provide a complete classification of all regular bone-idle graphs with small vertex degree.

Florentin Münch
„Betti number estimates for non-negatively curved graphs"
Abstract: To a graph, we assign a 2-dimensional cell complex by gluing a disk to all cycles of length at most 5. Assuming non-negative Ollivier curvature, we show that the first Betti number of this cell complex is at most half of the maximum combinatorial vertex degree. This estimate is sharp and we show that equality holds if and only if the graph is a discrete flat torus. This result extends to the case of non-reversible Markov chains and a general path distance in which case a slight adaptation of the cell complex, and a more general definition of discrete flat torus is necessary. We also give a Betti number estimate for graphs with some negative curvature. Then the first Betti number can be upper bounded by the number of edges which share at least one vertex with a negatively curved edge. This is a joint project with Moritz Hehl.

Simon Puchert
tba.

Marcel Schmidt
„Nonlinear Dirichlet forms and their extended Dirichlet space"

Ian Zimmermann
tba.