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Regularization as a Geometric and Stochastic Tool in Infinite Dimensions

On a class of Hilbert manifolds (or more generally vector bundles based on such a manifold with fibre) modelled on a space of sections of some finite rank vector bundle based on a compact boundaryless Riemannian manifold, we introduce a certain type of *renormalization (or regularization) procedure* which we use to *renormalize (or regularize)* some geometric quantites such as Laplacians [APZ], Ricci curvature, first Chern forms [PR] or the trace of the second fundamental form [AP]. This yields an overall framework for some of the renormalized quantities one comes across in the geometric and stochastic literature on infinite dimensional spaces. Manifolds in the above class arise naturally as "path spaces" in the context of functional quantization.

References: [AP] M. Arnaudon, S. Paycha, *Stochastic tools on Hilbert manifolds; interplay with geometry and physics*, Comm. Math. Phys. 187, 243-260,1997 M. Arnaudon, S. Paycha, *Regularisable and minimal orbits for group actions in infinite dimensions*, Comm. Math. Phys. 191, 641-662, 1998 [APZ] M. Arnaudon, S. Paycha, Y. N. Zhang, *Renormalized Laplacians on a class of Hilbert manifolds*, in preparation [PR] S. Paycha, S. Rosenberg, *About infinite dimensional group actions and determinant bundles,* contribution to the proceedings of a conference: "Analyse sur les groupes et algèbres de Lie de dimension infinie" Marseille, Sept. 1997