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*Connections between Geometry and Analysis on Manifolds and Path Spaces*

In the last decades there have been many connections made between the analysis of a manifold M and the geometry of M. Said correctly, there are now many ways to make precise that well-behaved analysis on M is 'equivalent' to the existence of lower bounds on Ricci curvature. Such ideas are the starting point for regularity theories and more abstract settings for analysis, including analysis on metric-measure spaces. We will begin this talk with an elementary review of these ideas.

More recently it has become apparent analysis on the path space PM of a manifold is closely connected to two sided bounds on Ricci curvature. Again, said correctly one can make an equivalence that the analysis on PM is well behaved iff M has a two sided Ricci curvature bound. As a general phenomena, one see's that analytic estimates on M lift to estimates on PM in the presence of two sided Ricci bounds. Our talk will mainly focus on explaining all the words in this abstract and giving some rough understanding of the broad ideas involved. Time allowing, we will briefly explain newer results with Haslhofer/Kopfer on differential harnack inequalities on path space.