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**Maximum Likelihood Estimation and Stochastic Processes
on Manifolds and Lie Groups**

Joint work with Anne Marie Svane, Alexis Arnaudon, and Darryl Holm

Statistics of data in non-linear spaces can be performed by fitting parametric families of probability distributions to data by maximum likelihood. We describe different approaches for constructing such families by mapping stochastic flows from Euclidean space to manifolds. In particular, we describe the use of frame bundles for representing and constructing anisotropic flows on manifolds with connection, and stochastic flows on Lie groups arising from applications in geometric mechanics. The different constructions treat curvature and holonomy in different ways emphasizing the connection between non-linear statistics, sub-Riemannian frame-bundle geometry, and group actions in geometric mechanics.