Abstract: The loop space of a Riemannian manifold has a family of metrics depending on a Sobolev space parameter. The Levi-Civita connections for this family gives rise to Chern-Simons forms on loop spaces. A manifold $M$ with a circle action gives both an element of the fundamental group of Diff($M$) and a cycle on $LM$. If a particular Chern-Simons form integrated over this cycle is nonzero, the fundamental group of Diff($M$) is infinite. We give examples where $M$ is the total space of a circle bundle over a Kähler surface.

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