Space - Loop Space Dualities with Applications to Superstring Theory

<u>Abstract</u>:

I will explain a few instances of a duality between differential-geometric structure on a smooth manifold M, and certain other differential-geometric structure on its free loop space LM. Such dualities have been found partially, and independently, in the work of Atiyah, Barrett, Brylinski-McLaughlin, and Stolz-Teichner; I will try to present them in a modern, unified framework.

The free loop space LM of a smooth manifold M is the configuration space of string theory, i.e. the space of all strings in M. Advanced versions of string theory require additional geometry on the configuration space, such as orientations, spin structures, or line bundles with connections. I will explain how space - loop space duality helps to relate such geometry on LM to well-understood, finite-dimensional geometry on M.