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Title: The K -theory of loop spaces and elliptic cohomology

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Let T be a torus. In 1994 Ian Grojnowski gave a construction of a T -equivariant elliptic cohomology theory associated to an elliptic curve over the complex numbers. However, as noted by Grojnowski himself, this construction is somewhat ad hoc and unwieldy to work with. Let M be a T -space and LM the space of free loops in M , so that there is an action of LT on LM , where LT is the group of free loops in the torus. Based on work of Nitya Kitchloo, we construct a version of equivariant K -theory for LT -spaces, and show that the LT -equivariant K -theory of LM is isomorphic to Grojnowski's theory on the T -space M . Since the loop space construction is motivated by the idea of fields on a circle, this suggests a physical interpretation of Grojnowski's theory.