

Seminari de Geometria Algebraica 2008/2009 (UB-UPC)

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The Hitchin connection, Toeplitz operators and TQFT

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The Witten-Reshetikhin-Turaev Topological Quantum Field Theory in particular provides us with the so called quantum representations of mapping class groups. The geometric construction of these involves geometric quantization of moduli spaces, which produced a holomorphic vector bundle over Teichmüller space. This bundle supports a projectively flat connection constructed by algebraic geometric techniques by Hitchin. We will present a differential geometric construction of this connection in a generalized setting. Furthermore its relation to Toeplitz operators will be discussed. In fact we will see that the parallel transport of this connection is a Toeplitz operator, hence manifestly placing Toeplitz operators within the study of TQFT's. We will further give applications of this, like the asymptotic faithfulness of these quantum representations and asymptotic expansions of the quantum invariants. Finally we will also discuss their application in our proof that the mapping class groups do not have Kazhdan's property T.
