

Seminar

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Central extensions of mapping class groups from characteristic classes

February 18, 2015

at 16:30 h

ESI, Boltzmann Lecture Hall

Abstract: In 3d topological field theories with nontrivial central charge one replaces 2-dimensional and 3-dimensional manifold by suitable "extended" counterparts, in such a way that the mapping class group of an extended surface is a Z -central extension of the mapping class group of the underlying surface, and the set of extensions of a 3-manifold with prescribed boundary behavior is a Z -torsor. In Segal's celebrated paper on conformal field theory, the extension consist in a "rigging", a solution which is not particularly simple and which is actually quite ad hoc for the 3-dimensional case. Namely, riggings are based on the contractibility of Teichmüller spaces and on the properties of the eta-invariant for 3-manifolds with boundary. On the other hand, Segal suggest that simpler variants of this construction should exist, the essential idea being that of associating functorially to any surface a space with fundamental group Z . And indeed there is a well known realization of extended surfaces as surfaces equipped with a choice of a Lagrangian subspace in their first real cohomology group. The main problem in this approach is how to define a corresponding notion of an extended 3-manifold. In the talk we will review how the simple and natural notion of p_1 -structure (a trivialization of the first Pontryagin class) provides a very simple realization of Segal's prescription, by showing how p_1 -structures naturally emerge in the context of framed cobordism. Joint work with Urs Schreiber and Alessandro Valentino.

Nils Carqueville

February 2, 2015