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Yang–Mills connections on 2-manifolds

In "The Yang–Mills equations over Riemann surfaces", Atiyah and Bott studied the Yang–Mills functional over a Riemann surface from the point of view of Morse theory. We generalize their study to all closed, compact, connected, possibly nonorientable surfaces. We introduce the notion of "super central extension" of the fundamental group of a surface. It is the central extension when the surface is orientable. We establish a precise correspondence between Yang–Mills connections and representations of super central extension. Knowing this exact correspondence, we work mainly at the level of representation varieties which are finite dimensional instead of the level of strata which are infinite dimensional.

I will explain the Yang–Mills functional and Yang–Mills connections over a Riemann surface and compare with the nonorientable surface case that we studied.

This is a joint work with C.-C. Melissa Liu.