

## ***TOPOLOGY SEMINAR***

**Guest Speaker: Donald Youmans**  
**University of Geneva**

**Date:** Tuesday, January 22, 2019

**Time:** 2:30 PM

**Location:** 258 Hurley Hall

**Lecture Title:**

**Conformality of two-dimensional Lorenz gauged BF theory**

### ***Abstract***

BF theory is, at heart, a topological gauge theory. Fixing the gauge cleverly allows one to study the theory from the point of view of conformal field theory, which is particularly rich in two dimensions. The interplay between the BRST and conformal symmetry forces the stress-energy tensor to be  $Q$ -exact. Unlike the standard procedure, we will not pass to  $Q$ -cohomology, which captures physical observables but study, in particular, non-gauge invariant (i.e. non- $Q$ -closed) correlation functions. We will start with the abelian model, which is a free theory, and show how the non-abelian model arises as a special deformation thereof. We will then continue by studying the non-abelian model perturbatively. Although the non-abelian model is an interacting field theory, one is able to compute many correlation functions exactly. Those correlation functions turn out to be single-valued polylogarithms. The talk will be divided into two parts, the first of which will be a survey about the topic. We will present the abelian BF theory from a point of view of conformal field theory. Remembering the primitive of the stress-energy tensor will allow us to define a variety of interesting objects, such as, for example, a BV algebra structure on the  $Q$ -cohomology or observables satisfying Wittens descent equations. We will show the equivalence of the theory with Witten's B-model and that the aforementioned descent observables allow us to consider new deformations thereof. One particular deformation will lead us to the non-abelian BF model, whose most important features, from the point of view of conformal field theory, will be discussed at the end of the first half. In the second half, we will dwell in some details and subtleties concerning the study of the non-abelian BF theory as a conformal field theory, such as the appearance of single-valued polylogarithms in the correlation functions and the emergence of fields of anomalous conformal dimensions.