

**ESI - SIMONS JUNIOR PROFESSOR
LECTURE COURSE
Winter Term 2015/16**

The Erwin Schrödinger International Institute of Mathematical Physics (ESI) of the University of Vienna is pleased to offer the following Lecture Course held by Simons Junior Professor **Nils Carqueville** during the Winter Term of 2015/16:

Topological Quantum Field Theory
Nils Carqueville (U Vienna)

Lecture Course (250104 VO): Thursday, 11:15 - 12:45

Begin: October 1, 2015

Venue: ESI, Schrödinger Lecture Hall

Abstract: The functorial approach to topological quantum field theory goes back to Atiyah and Segal. After a motivational discussion of the Feynman path integral and a brief, self-contained introduction to monoidal categories, the lecture is roughly divided into three parts.

(1) We will first study general properties of "closed d -dimensional TQFTs", and work out specific details for $d=1,2,3$. Interesting examples in the two-dimensional case are topological Yang-Mills theory, sigma models and Landau-Ginzburg models.

(2) We then move to "open/closed 2d TQFT" a la Moore-Segal and Lazaroiu, which "live" on surfaces that may have non-trivial boundary conditions. We will see that such TQFTs are equivalently described by an interplay of commutative Frobenius algebras and Calabi-Yau categories.

(3) Finally we add further structure to the surfaces by embedding certain one-dimensional submanifolds. This leads to "2d TQFT with defects". A minimal generators-and-relations description analogous to (1) and (2) is not known in this case, but we will explain that 2-categories are the natural language here.

This lecture course may be continued in the summer term 2016.

Joachim Schwermer
Director