Center for the Topology and Quantization of Moduli Spaces

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CTQM

MASTER CLASS

QUANTIZATION OF GAUGE SYSTEMS

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DEPARTMENT OF MATHEMATICAL SCIENCES, FACULTY OF SCIENCE, UNIVERSITY OF AARHUS

ABSTRACT: The goal of this master-class is to outline the semiclassical quantization of models of classical and quantum field theories with gauge symmetry. The main examples will be the Yang-Mills theory (its Euclidean version) in dimension 4 and the Chern-Simons theory in dimension 3. The class will start with the description of Lagrangian and Hamiltonian formulation of classical field theory. We will discuss the difference between first and second order classical field theories. Then we will see how the asymptotical expansion of oscillating integrals can be computed in terms of Feynman diagrams. After this we will move to the analysis of the semiclassical asymptotical expansions for the Yang-Mills theory and for the Chern-Simons theory. We will briefly discuss the renormalization issues for the Yang-Mills theory and will focus on invariants of 3-manifolds which appear as coefficients of the semiclassical expansion for the Chern-Simons theory. We will also see how the quantization of the Chern-Simons theory is related to the quantization of moduli spaces of flat connections in trivial principal G-bundles over surfaces.

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FOR REGISTRATION AND FURTHER INFORMATION PLEASE SEE THE CTQM WEBSITE:

Http://www.ctqm.au.dk/events/2009/MasterClassNov/

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