**Workshop on**

# Topics in the geometry and topology of moduli spaces

**Waseda University**

**Nishi-Waseda Campus, Building 60, Room 303**

**Saturday, 25 January 2020**

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Moduli spaces of geometric objects are an active area of research in mathematics and theoretical physics. They often possess interesting geometric structures such as hyperkaehler metrics and generally have nontrivial topology. Flat connections in bundles over Riemann surfaces are a source of important examples. These lectures will discuss several techniques of wide applicability in this area, including the non-Abelian Hodge Correspondence and the theory of Lagrangian Fibrations and Bohr-Sommerfeld Orbits.

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**The lectures will take place at the Institute for Mathematical Science, Waseda University**

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**SCHEDULE OF TALKS:**

**10:30-11:30 Florent Schaffhauser (IRMA, Strasbourg), "An overview of the Non-Abelian Hodge Correspondence (after Hitchin, Donaldson, Corlette and Simpson)"**

Abstract: The non-Abelian Hodge Correspondence is an equivalence between linear representations of the fundamental group of a smooth projective variety X and semistable Higgs bundles over X. In this talk, we will state the correspondence in the case when X is 1-dimensional and outline the strategy of the proof, following Carlos Simpson's original papers on the subject.

lunch

**13:30-14:30 Takahiko Yoshida (Meiji University), "Does the quantum Hilbert space depend on polarizations?"**

Abstract: When a symplectic manifold with prequantum line bundle is given, geometric quantization is a procedure to construct a representation of the Poisson algebra of functions to a Hilbert space called the quantum Hilbert space. In geometric quantization, several ways to construct a quantum Hilbert space are known. Among them is the Konstant-Souriau theory, in which the quantum Hilbert space is constructed by using a polarization. Since a polarization is not unique with respect to the given symplectic manifold, we have a natural question whether the quantum Hilbert space depends on the polarizations. In this talk, for the relationship between the quantizations obtained by using two typical polarizations, the Kahler polarization and the real polarization, we shall review some known results.

tea/coffee (room 301)

**15:00-16:00 Florent Schaffhauser (IRMA, Strasbourg), "Hitchin components for orbifold fundamental groups"**

Abstract: The purpose of this talk is to state an orbifold version of the non-Abelian Hodge correspondence and apply it to study the topology of representation spaces of cocompact Fuchsian groups: we define Hitchin components in the orbifold case and compute their dimension in terms of symmetric differentials on the base orbifold.

tea/coffee (room 301)

**16:30-17:30 Takahiko Yoshida (Meiji University), "An index theoretic approach to RR-BS"**

Abstract: In this talk, we shall explain an index-theoretic approach to the question stated in the first talk. This talk is based on the joint work with H. Fujita and M. Furuta.

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Nishi-Waseda Campus access map

Campus map (simple map, showing Building 60)

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**Organizing committee:** Martin Guest and Yasushi Homma (Waseda University)

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