

# Bundles over Surfaces and Eisenstein Periods for Loop Groups

Kyushu University, Fukuoka, JAPAN

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**Takeshi Abe** (Kumamoto University)

*Title: An example of strange duality for K3 surfaces*

*Abstract:* Strange dualities are dualities between spaces of global sections of line bundles on moduli spaces of sheaves. In this talk we discuss an example of strange duality for K3 surfaces.

**Takashi Ichikawa** (Saga University)

*Title: Riemann-Roch isomorphisms as infinite products*

*Abstract:* We express the Riemann-Roch isomorphisms by Zograf-McIntyre-Takhtajan's infinite products for a family of Schottky uniformized algebraic curves. This expression is related with the arithmetic of Chern-Simons invariants and geometric zeta values.

**Kyu-Hwan Lee** (University of Connecticut)

*Title: Eisenstein series on loop groups over function fields I, II*

*Abstract:* In these two talks, we will consider constructions of Eisenstein series on loop groups over function fields, developed by Kapranov, Garland, Patnaik, Lee and Lombardo. In particular, convergence of the Eisenstein series, computation of the constant term, and geometric interpretation of the series will be discussed.

**Dongwan Liu** (University of Connecticut)

*Titles: Eisenstein series on loop groups over number fields*

*Abstract:* Based on Garland's work, we construct the Eisenstein series on adelic loop groups over a number field, induced from either a cusp form or a quasi-character which is assumed to be unramified. We compute the constant terms and Fourier coefficients, prove their absolute and uniform convergence under the affine analog of Godement's criterion. For the case

of quasi-characters, the resulting formula is an affine Gindikin-Karpelevich formula. Then we prove the convergence of Eisenstein series themselves in certain analogs of Siegel subsets.

**Dongwan Liu** (University of Connecticut)

*Titles: Eisenstein series on Kac-Moody groups*

*Abstract:* We give a survey of recent results and work in progress about the convergence problem of Kac-Moody Eisenstein series. Under Godement's condition, we establish the absolute convergence of Eisenstein series and its constant term for all rank 2 Kac-Moody groups. Also we show that, for rank 2 hyperbolic case, the cuspidal Eisenstein series is an entire function. More generally, we reduce the convergence problem to a conjecture about Coxeter groups and root systems.

**Kotaro Sugahara** (Kyushu University)

*Title: Bundles over surfaces and Bruhat-Tits buildings I, II*

*Abstract:* In the first paper on 'Vector bundles and Arithmetical Groups I', Parshin constructs the Bruhat-Tits buildings for two-dimensional local fields. And in the second paper 'Vector bundles and Arithmetical Groups II', he establishes a correspondence between the spaces of Bruhat-Tits buildings and that for vector bundles over algebraic surfaces. All these works may be understood as a generalization of the related works of Serre for algebraic curves. We will explain them.

**Lin Weng** (Kyushu University)

*Title: Eisenstein periods I, II*

*Abstract:* Eisenstein series play key roles in arithmetic geometry and number theory. Eisenstein periods are defined as integrations of Eisenstein series over truncated domains. In the first talk, we explain our works on Eisenstein periods associated to reductive groups, particularly, their relations with non-abelian zeta functions and hence their applications to counting lattices over number fields and bundles over curves respectively. In the second talk, addressing to the difficulty that associated fundamental domains are not of finite volumes with respect to natural volume forms, we first formulate some conjectures on structures of Eisenstein periods associated to loop groups and then offer their applications to the problem of counting bundles over surfaces.